Program of the Month
Beat Those Tax-Time Blues

The Home User's Guide to Commodore Computing

RUN

U.S.A. $2.95
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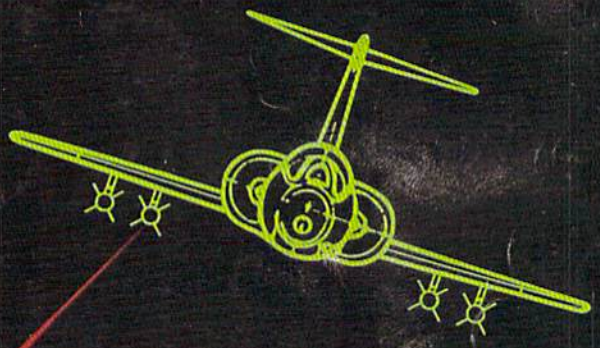
A CWC/I Publication
February 1985

JOYSTICKS!
Get a Grip On Arcade Action

TAG—YOU'RE IT!
A New Twist To an Old Game

WORD TEASERS
Can You Unscramble The Code?

COMPUTER CAMARADERIE!
Plug into a Club



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"Doodle! is a good value with a wide range of features. It'll show you a lot about the graphics capabilities of your Commodore 64."—RUN

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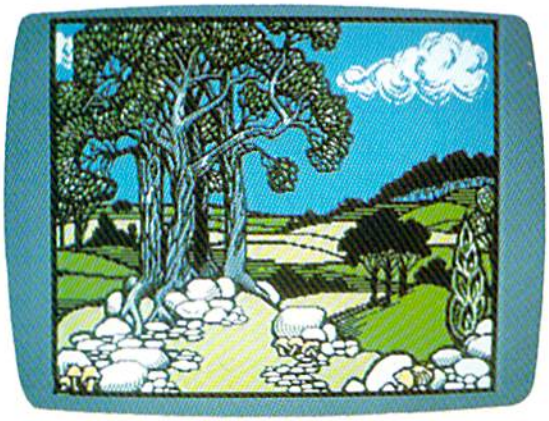

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By Mark R. Rubin

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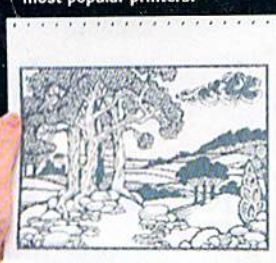

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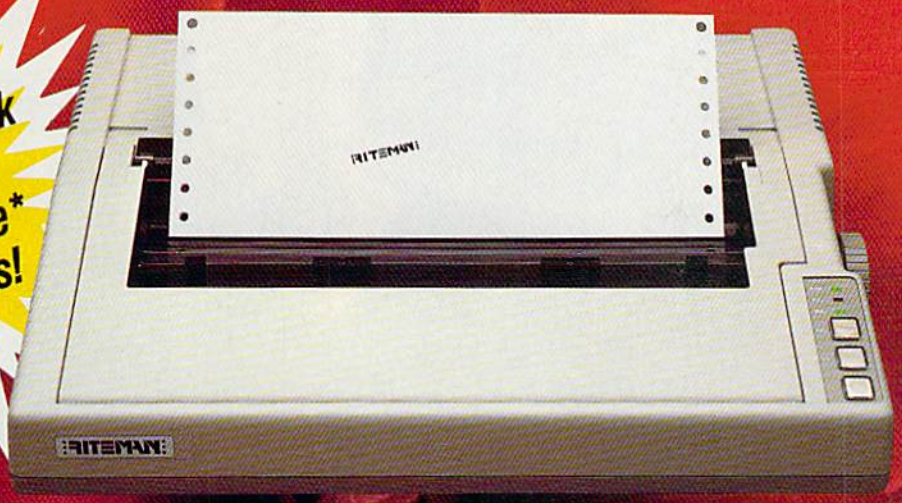

RITEMAN R64

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• PRINT METHOD	Impact Dot Matrix	
• SOFTWARE COMPATIBILITY	(1) Commodore MPS-801, 803,VIC 1525 (see printing mode 1)	
	(2) RITEMAN PLUS, EPSON MX-80 Type 3 G+ (see printing mode 2)	
• PRINTING MODE	(1) Reversed, Expanded and combination	
	(2) Normal, Expanded, Compressed, Italics, Double Strike, Emphasized, Underline, Super/Subscripts and combination	
• CHARACTER MATRIX	9 x 9	
• CHARACTER TYPES	ASCII	96
	Italics	96
	Semi-graphics	32
	Commodore Graphic	64
• PRINT SPEED	120 CPS	
• LINEFEED SPEED	100 ms	
• THROUGH PUT SPEED	63 LPM	
• COPY	Original + 2	

• NUMBER OF COLUMNS	Normal	80
	Compressed	132
	Expanded	40
	Compressed Expanded	66
• LINE SPACING	1/6", 1/8", 7/72", N/72", N/216"	
• PAPER FEED	Friction Feed	
	Sprocket Feed	
• PAPER WIDTH	Cut Paper	4 - 9"
	Roll Paper	4 - 9"
	Fanfold Paper	9½"
		4 - 10" (option)
• RIBBON LIFE	1 million characters	
• INKED RIBBON	Exclusive Cassette Ribbon (Black)	
• HEAD LIFE	100 million characters	
• INTERFACE	Serial (Commodore)	
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• SIZE	2 7/8" (H) x 10 9/16" (D) x 14" (W)	
• WEIGHT	11 lbs.	
• WARRANTY	1 year (Parts and Labor)	
• ACCESSORY	Printer Cable (Commodore)	
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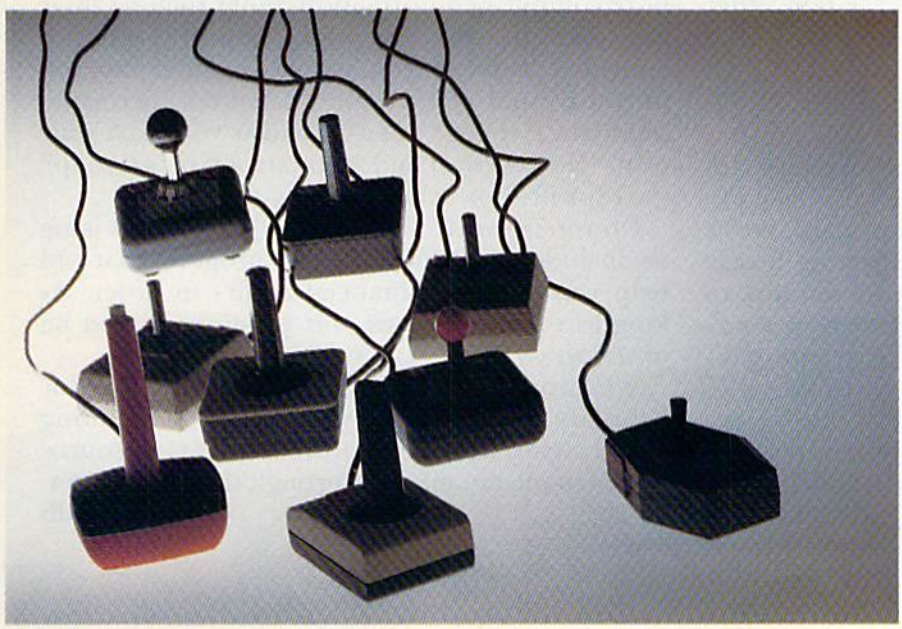

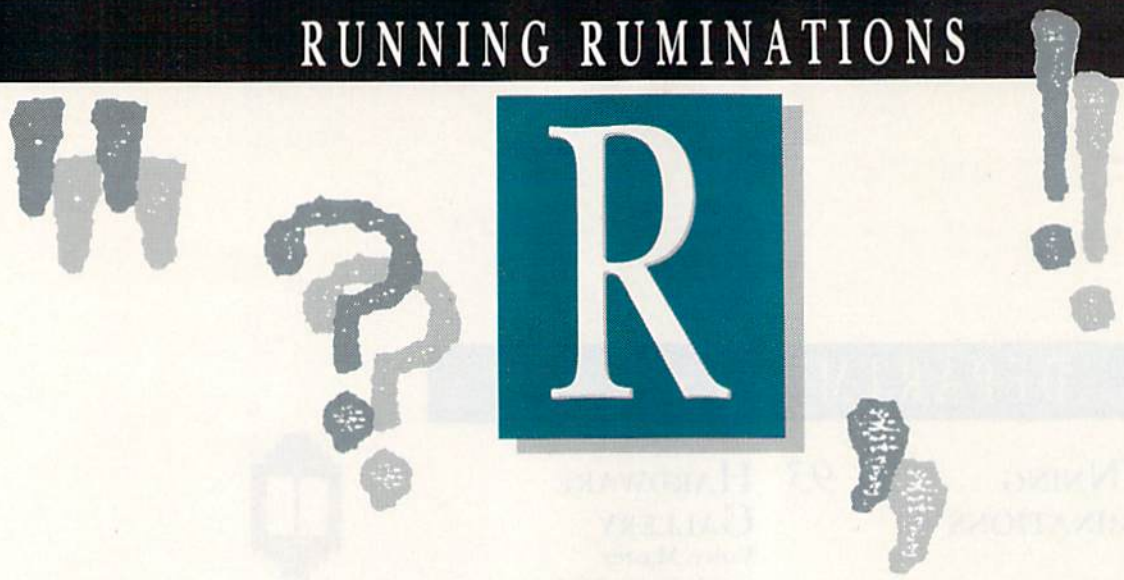

IN THIS ISSUE...

Among *RUN* readers, the most popular peripheral for the Commodore systems is the joystick. The number exceeds that for cassette recorders, disk drives and even printers.

It is appropriate, then, that we have devoted several articles in this month's issue to joysticks—those devices of delight that let you experience the excitement of fast arcade action right in your own home.

Like computerists, joysticks come in all shapes and sizes—from GIM Electronics' heavy-duty Fire Command to Suncom's lightweight joysticks. But they all share one thing in common—they give you the responsiveness you cannot experience with keyboard entry.

In this month's issue, "Joystick Joust" (p. 26) takes a look at the most popular joysticks on the market, and there are many. Which one is your favorite? You may be surprised to see how other *RUN* readers answered this question in *RUN*'s first joystick poll.

Are you sometimes frustrated in your attempts to achieve a game-high score—not because of your playing ability, but because of your joystick's lack of performance? Well, here's some good news to help you rack up more points on the board. We've included a simple hardware modification article ("Ready, Aim, Fire!" p. 36) that shows you how to put the joy back into your broken Atari or Commodore stick. No engineering degree is required—just a simple adjustment with a screwdriver.

This February issue also features one of the most entertaining joystick games we've run across in a while. "You're It!" (p. 46) is a delightful computer version of the children's game, Tag. In back-and-forth action, you and an opponent chase one another around the screen and in and out of hiding places provided. You'll appreciate how much fun Commodore Tag can be.

Based on the reviews we have published in the magazine, many of our readers have decided to purchase a Plus/4 computer and have praised its sophistication and remarkable ease of use. One of its features that makes it so simple to use is the built-in software—word processor, database, spreadsheet and graphics, all of which interact with one another. *RUN*'s technical editor, Margaret Morabito, continues her series on how to use these built-in programs. Find out why this "productivity machine" is one of the most versatile on the home computer market.

One of the most valuable sources of Commodore computing information (other than *RUN*) is the computer club, or user's group. If you're not already a member, you should consider tapping into this pool of incredibly talented microcomputerists. If there's not a club near you, start your own. "How to Start and Maintain a User's Group" (p. 18) will show you how.

Do you dread Tax Day, 1985? Well, in this issue we include a helpful tax utility program that will help you get your financial affairs in order. As long as there are taxes, this program should be of use to you.

We hope you enjoy this selection of articles for February, when, as everyone knows, computing activity really heats up. Consider *RUN* your source of sustenance to make it through the long winter.

db

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How to type listings from

RUN

Typing in listings can be difficult enough without having to worry about strange graphics characters, charts or tables. That's why we decided to make it easy to enter listings from *RUN* by translating everything we thought might be confusing in any program.

When you see something between the curly brackets, all you have to do is press the keys indicated. For example:

{SHIFT L}—means hold down the shift key and press the L key at the same time.
{COMD J}—means hold down the Commodore key (it is on the lower left side of the keyboard) and press the J key at the same time.
{SHIFT CLR}—hold down the shift key and press the CLR/HOME key.
{HOME}—press the CLR/HOME key without shifting.
{CTRL 6}—hold down the control key and press the 6 key.
{FUNCT 2}—function 2 (in this case, you hold down the shift key and press the function 1 key).
{CRSR UP}{CRSR DN}{CRSR LF}{CRSR RT}—these are the four cursor directions.
{UP ARROW}—means the arrow key (the one with the pi sign under it).
{LB.}—the British pound sign (£).
{PI}—the pi sign key (π); (shift and press the up arrow key).

In some instances, when a large number of characters or spaces are repeated in a listing, we will represent them this way: {22 spaces} or {17 CRSR LFs}.

Print vs Print#

RUN readers should be aware of difficulties that may arise when entering listings that contain the PRINT and PRINT# commands.

These two commands may look very similar, but they are different. If, for example, you use a question mark (?) to abbreviate PRINT in a line such as 10 PRINT#4,A$, then you are signaling to the Commodore computer that you are trying to print the variable #4, which is not a legal variable name.

The command PRINT#4 actually means "print to file number 4." You can abbreviate PRINT# by hitting the P key and the shift and R keys at the same time and then entering the file number. But *do not* abbreviate PRINT# with a question mark.

If you think of PRINT as one command and PRINT# as an entirely different command, then you should have no problems.

■ ■ ■

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MAGIC

Compiled by LOUIS F. SANDER

MAGIC is tricks, MAGIC is fun. MAGIC is doing what cannot be done.

Every month, Magic brings you brief and useful computer tricks from around the world—tricks to make computing easier, more enjoyable or more exciting. We number our tricks in hex, the counting system of sorcerers and computerists.

Magic solicits your simple hardware ideas, short programs, useful programming techniques, little-known computer facts and similar items of interest. We look for new or recycled material that can be implemented with a minimum of time, effort or theoretical knowledge and that is of current value to Commodore computerists (Plus/4 and C-16 owners, too). We pay up to $50 for each original trick we print. Send your tricks to:

MAGIC
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PO Box 101011
Pittsburgh, PA 15237

If you enclose a self-addressed stamped envelope, we'll send you a Trick Writer's Guide.

From Lapland to Los Angeles, legions of learned ladies are discovering the details of digital dazzlement. As you'll see from this month's Magic, their work is of the highest sort.

Male or female, your own ideas give life to our world of witchly wonders. Each month, readers send us something for everyone, and we print the very best from a wide range of subjects. In addition to simple tricks, we look for intermediate to advanced material, shorter than two typewritten pages, whose programs will fit on one screen. Tricks like this month's DOS Improver, Sort Subroutine and Magic ML Poker are *most* welcome in Magic's hallowed halls.

As you can see from this month's assortment, there's voodoo enough for all. Wanga, candle, book and bell, Magic's doing *very* well. . . Shamans, start your sortilege!

$18E My valentine—Listed, these lines lack logic. Run, they're redolent with sentiment. Together, they make a valentine that must be seen to be believed. So type them in for your sweetheart—you won't be disappointed.

The program runs on a VIC or C-64 and is best experienced on a well-adjusted color display with the sound turned up to max. The more you know about exponential notation, the better you'll get the message.

```
10Ø REM MAGIC VALENTINE WITH SOUND
11Ø REM CREATED BY LOUIS F. SANDER
2ØØ PRINT"{SHFT CLR}":S=54296:IFPEEK(213)=2
    1THENS=36878
2Ø2 POKE53281,1:POKE198,4:POKE631,28:POKE63
    2,211:POKE633,157:POKE634,5
2Ø4 A$="MFU!NF!DPVOU!UIF!XBZT;IPX!EP!J!MPWF
    !UIFF@":P$="{HOME}{2 SPACEs}{6 CRSR DNs
    }"
2Ø6 FORI=1TO41:J=(-1+ASC(MID$(A$,I))):K=K+J
    :B$=B$+CHR$(J):NEXT
2Ø8 IFK<>2756THENPRINT"TYPING ERROR IN A$":
    STOP
21Ø A$=MID$(B$,23):B$=LEFT$(B$,22):PRINT"{C
    RSR DN} "A$:PRINT"{CRSR DN}"B$
212 FORI=1TO33:GOSUB216:FORJ=1TO3ØØ-I{UP AR
    ROW}1.8:NEXT:NEXT
214 I=2.1*I:GOSUB216:GOTO214
216 POKES,15:POKES,Ø:PRINTP$I:RETURN
```

Louis F. Sander
Pittsburgh, PA

$18F Screen gem—My junior high school students find it greatly entertaining and informative to enter POKE 53265,59 and then to type on the C-64 keyboard. Pressing the run/stop/restore keys gets you out.

Katherine Prescott
Coos Bay, OR

$190 DOS improver—This program changes the C-64's DOS 5.1 program so it can be easily saved onto other disks. Here's how to use it:

- Put the test/demo disk into your drive
- Type LOAD "DOS 5.1",8,1 {RETURN}
- Insert a formatted disk onto which you want to save DOS 5.1
- Type NEW {RETURN}
- Load and run this program
- Type SYS 52224 {RETURN}
- Type SYS 52400 {RETURN}

DOS 5.1 will now be saved onto the disk in your drive, and the C-64 will be reset. If you want to save the DOS

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For a limited time only, MUSE® will include a blank BASF qualimetric disk free with the purchase of the SMART START™ program.
SMART START

SMART START™... REALIZE THE GREATEST POTENTIAL OF YOUR COMMODORE 64

Sound, graphics and other advanced features are what make the Commodore 64 as popular as it is. But these features can also require a lot more programming know-how than many Commodore owners care to learn. That's why MUSE® developed SMART START™—to harness the power of the Commodore and put it conveniently at your finger-tips.

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onto another disk at this time, just put the new disk in the drive, and resurrect your wedge by entering these commands:

SYS 52224 {RETURN}
@#8 {RETURN}

Then save it by typing SYS 52400 {return}. You can repeat these steps as many times as you like; many people put a copy of DOS 5.1 on every disk they own.

Once DOS 5.1 has been saved on a disk, you can also save Test/Demo's Basic loader, named C-64 Wedge, if you choose to. Since C-64 Wedge is a Basic program, saving it is a simple matter. When loading DOS into memory, you don't need the loader at all if you type:

LOAD "DOS 5.1",8,1 {RETURN}
NEW {RETURN}
SYS 52224 {RETURN}

When you see the DOS 5.1 prompt, you're in business, just as if you'd used the loader.

The best way to learn about the wedge is to read "Mysteries of the Wedge Revealed" (*RUN*, September 1984).

```
1Ø REM{2 SPACEs}DOS IMPROVER
2Ø REM{2 SPACEs}CREATED BY LOUIS F. SANDER
3Ø FORA=1TO69:READB:C=C+B:NEXT:RESTORE
4Ø IFC<>7162THENPRINT"DATA ERROR":STOP
5Ø FORA=1TO32:READB:POKE52346+A,B:NEXT
6Ø FORD=1TO37:READE:POKE52399+D,E:NEXT
91 DATA 141,Ø68,Ø79,Ø83,Ø32,Ø53,Ø46,Ø49
92 DATA Ø32,Ø45,Ø32,Ø83,Ø89,Ø83,Ø32,Ø53
93 DATA Ø5Ø,Ø52,Ø48,Ø48,Ø32,Ø84,Ø79,Ø32
94 DATA Ø83,Ø65,Ø86,Ø69,141,ØØØ,ØØØ,ØØØ
95 DATA 169,ØØ8,17Ø,16Ø,255,Ø32,186,255
96 DATA 169,ØØ7,162,124,16Ø,2Ø4,Ø32,189
97 DATA 255,169,ØØØ,133,Ø34,169,2Ø4,133
98 DATA Ø35,169,Ø34,162,Ø9Ø,16Ø,2Ø7,Ø32
99 DATA 216,255,Ø76,226,252
```

L.F.S.

$191 Neater wiring—A solution to your computer room's rat's nest of wires and cables can be found in your local garden shop. Double-sided strips of Velcro intended for use as plant ties can be cut to any length to bundle up those runaway wires. The strips can be easily moved, unwound, loosened, tightened and reused, giving greater flexibility than electrical ties provide.

Donna A. Trefry
Scarborough, ME

$192 Word processor glossary—Dedicated office word processors often provide a glossary function that allows frequently used words and phrases to be recalled by a two-letter code. This function can be approximated on any word processor that offers the Search and Replace feature. As the document is typed, use a two- or three-letter acronym. Then go back and search and replace every acronym with the desired phrases. For example, I used MRC in a report where I needed to use the phrase "Microcomputer Resource Center" numerous times.

Jo Ann Strohn
Dublin, OH

$193 Wordpro parentheses—With many printers, you get more readable copy if you use spaces to separate parentheses from the material they enclose. But sometimes that leaves you with a dangling parenthesis (one that sits by itself at the beginning or end of a printed line). To avoid the problem, try using shifted spaces to separate your parentheses. With Wordpro, and perhaps with other word processors, the computer treats the shifted space as an invisible letter and will not break a line on it.

You can also use this trick to make the line break occur where you want it in the printout. Just be sure you don't type too long a line of words and shifted spaces. If the combination won't fit on a single line, you'll abort printing and get an error signal.

Sarah Knutti, MD
Bethesda, MD

$194 Making tables—If you need a table for a term paper or business report and are having trouble using a word processor to set it up, try using a spreadsheet program. The spreadsheet's features will greatly simplify the mechanics of spacing and tabulation.

Elizabeth Oman
Lindsborg, KS

$195 Easy Script music—On my husband's version of Easy Script, pressing f1 and CTRL 3 causes the computer to play Pomp and Circumstance through the monitor's speaker. My own version of the program, an older one, doesn't have this feature at all. So if you've heard of the Easy Script/Pomp and Circumstance connection, but can't make it work on your own machine, maybe you have an older version of the program.

Karen Rhodes
Orange Park, FL

$196 Database Deluxe improved—If you love the Database Deluxe program printed in *RUN* (February 1984) and ReRUN, but wish the printout were single spaced rather than double, make the following changes in the VIC version (C-64 owners should make the same changes to lines 740 and 790):

Line 74—Delete the CHR$(10) and change LL = LL + 2 to LL = LL + 1

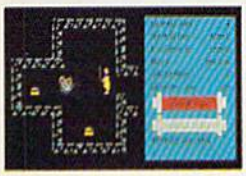
Line 79—Alter the paging statement to read IF LL > 55 THEN FOR NL = LL TO 67: (rest of line is okay)

The last line printed on page one is 55, and 67 is the first line printed on page 2. The difference between these two numbers determines the depth of the top and bottom margins. Twelve gives a nice one-inch margin.

Lorraine Richards-May
Leesburg, IN

Continued on p. 86.

WELCOME TO APSHAI.™
YOU'RE JUST IN TIME FOR LUNCH.



Boy, have you taken a wrong turn. One moment you're gathering treasure and the next you're being eyed like a side of beef.

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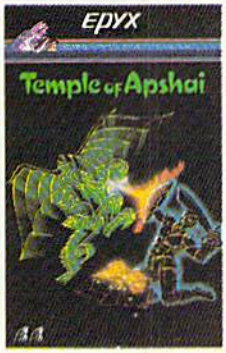
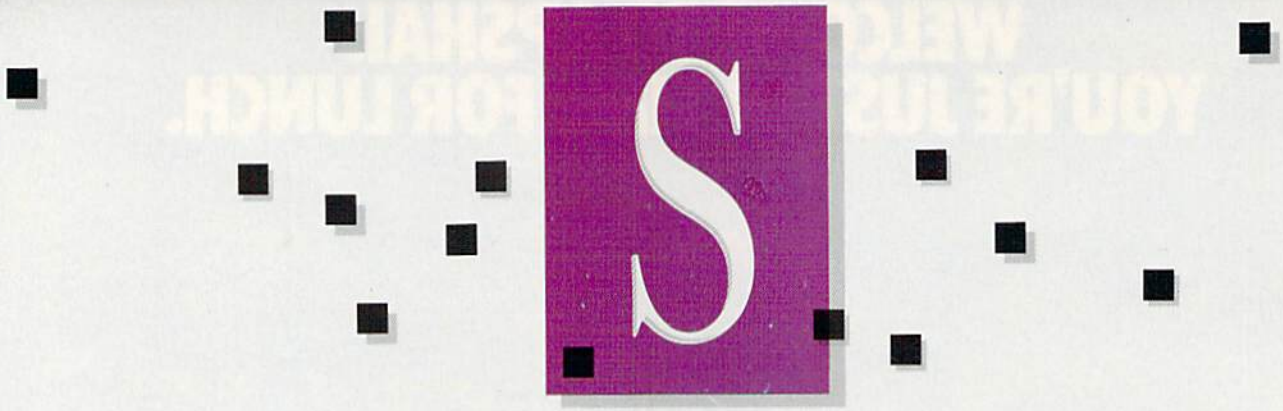


Circle 12 on Reader Service card.



Compiled by SHAWN LAFLAMME

The Heist

A

A Secret Agent Plans a Heist In a Gallery of Peril

If you consider scrolling screens, superb animation, split-second timing and strategy to be essential ingredients in an enjoyable C-64 game, then you're going to love The Heist.

The game has three levels, each with a choice of regular or difficult play options. Each level consists of three floors, with ten rooms per floor (a total of 90 rooms). That should be enough to keep you occupied for a while!

The scenario is this: Your on-screen hero, Graham Crackers, is a secret agent. The enemies of world peace have stolen a top-secret microdot plan for a doomsday machine and have hidden it in the canvas of a valuable painting, which is now hanging in an art gallery. Graham's task is to infiltrate the gallery and heist all the artwork in order to recover the microdot.

Considering that there are 90 rooms filled with priceless works of art, this task in itself is a considerable one. Adding to the challenge is the tight security in the gallery. Among the obstacles that Graham will have to overcome or avoid are monitors, drones, sweepers and electric gates. He'll also encounter keys, which he'll need to unlock certain doors in order to complete his thievery.

The game itself is virtually packed with objects that are worth points. For instance—opening a door is worth 250 points, disabling a monitor will yield 100 points, stealing a piece of art is worth 150 points and keys are worth 50 points. There's also a timer that starts at two minutes and counts down; each time you swipe a painting or grab a key, any seconds remaining will be awarded to you as points. The timer then resets to the original two-minute span and starts the countdown again. Poor Graham has his hands full—on top of his already difficult task of espionage, he has to play beat the clock, too!

Play-action is achieved through both the joystick and keyboard. The stick's fire-button makes Graham jump. The keyboard is used for activating the elevators—pressing 1, 2 or 3 will deliver Graham to the corresponding floor. Press the K key and Graham will commit suicide. (There are some situations from which the little guy just can't escape!)

At the start of the game, Graham is given three lives. An additional life is earned at the 10,000-point level, and you'll definitely need it to proceed on to the next levels. There are certain obstacles (e.g., drones) that cannot be neutralized; if you don't clear a drone by jumping over it, Graham loses a life. Sweepers, which are spherical objects that continually oscillate back and forth, are also potentially fatal. You must either jump over them or out-run them.

Keys serve a dual purpose: They can be used for both unlocking doors and neutralizing monitors. Once a monitor is neutralized, it remains harmless for the remainder of that particular level. The keys are essential to complete a level, however, and good strategy dictates that you shouldn't waste them only on the monitors, lest you find yourself with a few doors left on the level and no keys with which to open them. If that should happen, there's always the suicide key—not much of an option, but then again, this is pretty serious business.

The floor plan of the gallery is circular; that is, if you make Graham run continously in one dirction, he'll eventually get back to his starting point (as long as he doesn't encounter a brick wall or some other immovable object). There are alternative ways of getting from one floor to another; in addition to the elevators, you'll come across some escalators and jumping-off places, which will allow you to go

Report Card

A ***Superb!*** An exceptional program that outshines all others.

B ***Very Good.*** One of the better programs available in its category. A worthy addition to your software library.

C ***Good.*** Lives up to its billing. No hassles, headaches or disappointments here.

D ***Mediocre.*** There are some problems with this program. There are better on the market.

E ***Poor.*** Substandard, with many problems. Should be deepsixed!

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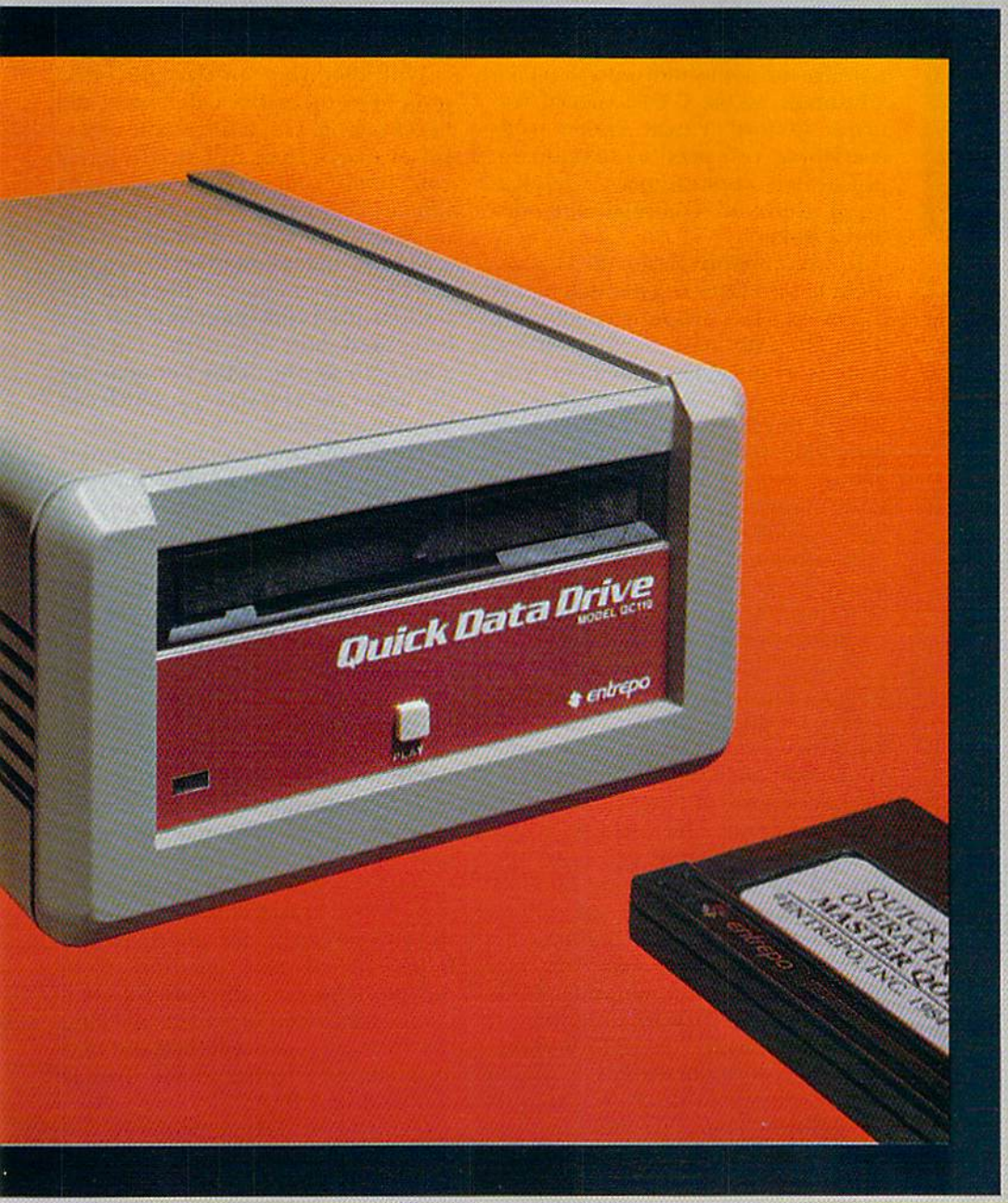

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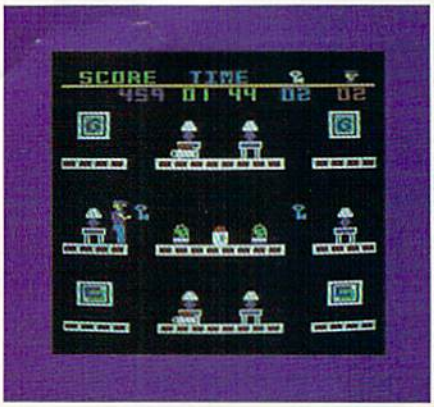


from a higher floor to a lower floor. You can save your precious keys by utilizing these devices. Strategy plays a big part here, and becoming familiar with the layout of the rooms on each of the floors is the best way to assure the success of Graham's mission.

The Heist is a deceptively simple-looking game at first-glance, but proves to be quite difficult to play all the way through. The play-action is lively and demanding on the normal difficulty level. On the more advanced level, it's close to impossible; the monitors, sweepers and so on, all move at nearly double their normal speed.

A word of warning about The Heist—it's addictive. You'll find yourself booting up the disk again and again, trying to outdo your best previous effort. *(MicroLab, 2699 Skokie Valley Road, Highland Park, IL 60035. $35.)*

Tom Benford
Osborneville, NJ

Oxford Pascal B

A Powerful, Affordable Version of Pascal For the Serious Programmer

How much time do you spend debugging your programs? Are you able to develop large programs easily? After setting one of your programs aside for a time, can you come back to it and figure out what it does? If the answer to these questions is no, then maybe the problem lies not with your programming skills, but with the language you are using.

There are now several languages available for your Commodore 64, and one of these is Pascal. Oxford Pascal, from Oxford Computer Systems (distributed in the U.S. by Limbic Systems), is an implementation of standard Pascal. Included with the package are some additions that take advantage of the C-64's special features. Oxford Pascal comes with everything you need to develop sophisticated applications—a full-featured editor, two compilation modes and a linker.

In Commodore Basic, the If statement has no Else, and the statements following Then are restricted to one line. The only looping that can be done is with the For statement. You can construct other loops with GOTO, but this is exactly what makes programs hard to read, modify and debug. Oxford Pascal makes decisions simple with If...Then...Else and a Case statement. Looping is very easy with the While and Repeat statements, as well as the For loop. With While and Repeat, you can loop on a condition such as end-of-file.

Dealing with data is one of Pascal's strong points. You have not only integer, real and string data types, but Boolean as well. You can also define your own data types. Another important feature of Pascal is the structured data type. This includes arrays as well as some other types that the Basic programmer is not familiar with, such as records, sets and pointers and the ability to combine the different types. This makes it very easy to describe and manipulate the data processed by your program.

Oxford Pascal comes with some extensions to standard Pascal which take advantage of the C-64's unique capabilities. There are built-in procedures that make it easy to create music and sound. These are Envil (voice, attack, decay, sustain, release), Voice (number, frequency, wave, duration) and Volume (level). A very useful function to manipulate the screen, Vdu (x, y, character), will put the specified character at row x, column y. Peek, Poke and Getkey have also been included. Other screen commands are Border and Screen, allowing you to set screen and border colors.

Oxford Pascal also comes with the following built-in hi-res graphics commands: Ink(color) and Paper(color), which set hi-res plot and screen colors; Hi-res (0 = off/1) and Examine(x,y), which determine if a point is on or off, and a general-purpose Plot procedure.

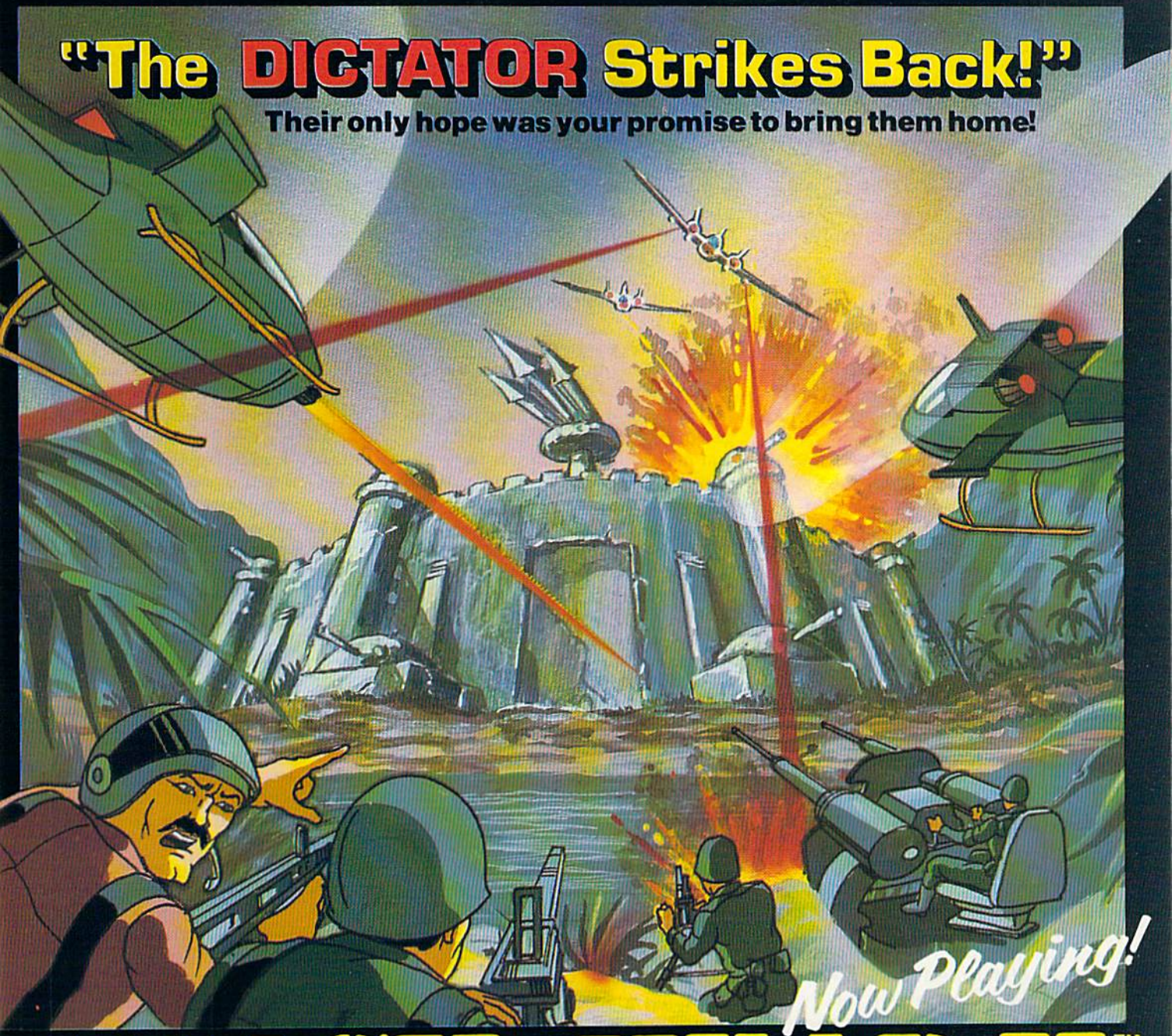
With Plot, you can clear the background to the paper color, clear the hi-res screen, plot a line, clear a line, fill an area or clear an area. However, you cannot plot points with x coordinates larger than 255, and there is no Multicolor mode. You can set up a window that allows you to use just a specified number of lines for hi-res, but the raster interrupt has not been used quite effectively. There is a lot of flickering at the boundary of the hi-res and text screens, which can be very annoying.

This problem, however, is minor compared to the capabilities at your disposal. You can also access any device on the serial bus with Reset and Rewrite, define hexadecimal constants, read and write hexadecimal, manipulate bits, trap I/O errors and chain programs from the disk.

In order to develop large programs, a good editor is an absolute necessity. Oxford Pascal includes features that have been excluded from the Basic editor, while retaining the full screen features. The added commands are: Auto (automatically numbers lines), Number (renumber the program), Find (find and print strings in the program), Change (substitute one string for another) and Delete (delete program lines from memory). Several other useful commands have been provided, allowing you to convert between hex and decimal, dump a listing to the printer and cold-start Basic.

Oxford Pascal comes with two versions of its compiler—a Resident mode and a Disk mode. With the Resident mode, both the compiler and your program reside in memory. This makes it easy to write and test your programs. Compilation of small programs is quick and execution is immediate. You can also compile your program and have it listed on the screen or the printer.

The Disk mode allows you to develop larger programs. In this mode, the compiler is no longer resident, allowing you to edit larger programs.



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Cinematography: Marjorie Nerdin Production Assistant: Audree Jones Casting: Jean Miner Special Effects: Kathryn Ashby Promotion: Connie Stringham Executive Production: Kevin L. Jones & Associates

Voices: Electronic Speech Systems Illustrations: Doug Van De Grift Based upon the book "The Goliath Syndrome" by James L. Slade

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Raid Over Moscow

Beach-Head

COMMODORE 64

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Your program must be saved on the disk and the compiler loaded. Once you have compiled the program to disk, you can execute it with the Ex command. There is also a feature that allows you to link separately compiled programs together to form one object program.

Anyone who has previous experience with Pascal or other compiled languages should have no trouble with this program or the accompanying documentation. The low cost of this package, combined with its many features, make it a very attractive buy for those who wish to learn a powerful new language. *(Limbic Systems, Inc., 560 San Antonio Road, Suite 202, Palo Alto, CA 94306. $49.95.)*

David A. Salvati
Houston, TX

Knights of the Desert

B

British and German Forces Clash in the Sands of North Africa

Knights of the Desert is a simulation of the North African campaign of World War II, beginning in March 1941. The only things missing are desert sand in your boots and the blistering African sun on your shoulders.

The game presents the same problems that faced both the Allied and Axis commanders. The key is to capture and hold Tobruk. You'll appreciate the genius of Rommel, O'Connor and Montgomery after you spend a couple of hours pouring over the same campaign maps that they sweated over, searching for a crack in the enemy's defenses.

If you enjoy complex strategy games, you'll delight in the options and variables offered in this program. There are two play options. Two humans can challenge each other, or one player can compete against the computer. But beware of the computer—it always takes the Allied side, and it is an expert at waging war.

You can play the game strictly according to history. With this option, reinforcements, supplies, air support and other factors are determined with historical accuracy. Or, if you prefer, you can choose between 10 different ratings, from novice to expert. You can play one turn (Tobruk '41) or 12 rounds covering the full campaign (March 1941 through January 1943).

A novice wargamer will have to spend some time studying the 24-page manual. There is a small mountain of decisions to make before you get your troops on the move. First, you must reinforce and supply your depot troops. They'll follow your attacking troops; without them, your armor and infantry divisions would quickly consume all their supplies and die in the desert.

After the depots, you have to reinforce and supply your combat troops. Supply lines are a constant concern. Next, you must plan your attack route. Should you stay near the safe, easy-to-travel coast? Or should you take the shorter, but more demanding, route across the desert?

The Axis commander must be concerned about the British "desert rats" attacking and depleting his sorely needed supply depots. The Allied commander must protect his long supply route between Tobruk and Alexandria.

When in battle, you must determine whether an enemy attack is an all-out offensive or just a probing. You don't want to waste supplies or air support on any small scale affairs. In the desert, supplies are too hard to come by to waste.

The order of attack is as important in Knights of the Desert as it is in real battle. To succeed, you will need to organize your attacks. For instance, attacking Allied armor with Italian infantry would be suicidal.

Sometimes it is better to outmaneuver the enemy than attack them. If you can cut the enemy's supply line, victory becomes only a matter of waiting for them to exhaust their supplies.

The complexity of Knights of the Desert will intimidate some users. There is a multitude of factors to consider, such as terrain, morale of troops, troops supplied or unsupplied, air support, intensity of battle, risk, portage and fortification, to mention a few. But experienced wargamers will feel very much at home with this game. The screen is a delight. It is a symbolic hex display, similar to what you would expect in a good board game. Only a portion of the screen can be viewed at any given time, but by moving the cursor, you can scroll the map and inspect friendly troops from El Agheila to Alexandria.

The troops are represented by block symbols. Up to six troop units can occupy, or stack, on a single hex (similar to board games). By using the cursor, each friendly unit can be inspected and moved.

The complexity of this game is paid for with speed. The game is slow, simply because so many variables must be checked and compared. There is no average playing time. If you decide to fight the entire two-year campaign, non-stop, be prepared to lose some sleep. But Strategic Simulations was kind enough to include an option allowing you to save the game at the end of each full turn. (Each turn takes roughly 45 minutes to an hour to complete.)

Knights of the Desert is a top-notch strategy game. Strategic Simulations has taken the features of a board game and successfully merged them with the capabilities of the Commodore 64. *(Strategic Simulations, Inc., 883 Stierlin Road, Mountain View, CA 94043. $39.95.)*

Gary V. Fields
Asheville, NC

Flying Colors

A

Fly the Friendly Screens To the Graphics Of Your Dreams

Flying Colors, for the Commodore 64, is a joy to draw with. Designed to be accessible to even the most computer-shy, the major features of this graphics package can be learned in about ten minutes (without referring to the quite lucid documentation), and a little more experience with the program can't help

but bring out the Picasso in you.

The reason Flying Colors is so easy to use is that it is controlled almost entirely by cursor-selected functions on the Main, Color and Disk menus. This is especially true when the program is used with an analog input device, such as a touch tablet, or the newer potentiometer-type joysticks, which have two buttons.

The Main menu appears on the right side of the screen and allows you to select a particular mode in which to operate, as well as giving you access to the other menus. From top to bottom, the functions are as follows:

Brush. This takes you to the Color/Brush menu, from which you can choose any of 16 colors and 11 brushtips. To select, simply place the cursor over the color or brushtip and press the controller button. Selecting the menu option will return you to the Main menu.

Speed (digital) or Micro (analog). Depending upon your input device, you can use one of these options to give you precise control over cursor movement. The Speed option gives you a speedometer, which you can adjust with the controller. Once you have set the desired level, you can switch from that speed to normal speed with the function keys. Micro creates a small field around the cursor, which slows cursor movement. The field can be moved around the screen by bumping its edges with the cursor.

Grid. This function allows you to create a grid (similar to graph paper) in any color and scale. The grid can be made to appear, disappear or become a permanent part of the picture.

Draw. This allows you to draw (freehand) by pressing the controller button and moving the cursor around the screen.

Line. This mode generates a straight line between any two points and can be easily aborted if you change your mind.

Box and Circle. These are similar modes that create boxes and circles, respectively. When used with the flat or angled brushtips, they can perform some rather interesting perspective tricks.

Fill. This allows you to fill any enclosed shape with the color of your choice. If you change your mind, you can either refill the shape with a different color or use the Change mode, which will change all the areas and lines of the color specified to a new color. Change can also be used to alter the background color of the screen to any shade on the menu.

Alpha. This function makes it possible to add text anywhere on the screen, in any color, and edit it as necessary. This is useful for labeling charts and supplying captions for your art.

Clear. Returns you to a blank screen.

Disk. This takes you to the Disk menu, where you can initialize a storage disk, save, retrieve and delete your artwork. One disk can hold about sixteen pictures on each side. Once saved, there is a special program included in the package that makes it easy to load illustrations into your own programs (a tremendous boon to writers of educational and adventure software).

Flying Colors also features a unique function, called the Slide Projector, which allows you to preset and show off your work in any order you desire, either automatically or manually. The slide tray will hold 18 pictures and can be linked to other picture-storage disks to produce a longer show. As an educational toy, it provides an excellent way for children to write and illustrate their own stories.

Overall, this package is a tremendous bargain. Flying Colors is a useful and fun program for both children and adults. *(The Computer Colorworks, 3030 Bridgeway, Sausalito, CA 94965. $39.95.)*

Ken Goehner
Oceanside, CA

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User's groups can be a tremendous source of information and software exchange. If you don't have a Commodore group in your area, here's an article that tells you everything you need to know about starting one up and keeping it going.

How to Begin and Maintain

A User's Group

By ANNETTE HINSHAW

A user's group is a computer club whose members use the same kind of computer, and who meet to share information and software. User's groups are so valuable that if you can't find one, you should start one.

I'll show you how to begin and maintain a user's group and how to participate in other computer clubs, based on my experiences in founding the Tulsa Area Commodore User's Group (TACUG).

A user's group offers many or few services, according to its members' participation. When enough people help, no one needs to feel burdened by the work necessary to maintain a group. With enough different minds and experiences in the group's resource pool, you'll find solutions to almost any computer-related problem.

You will find many advantages to participating in a user's group. Some of these include:

- an inexpensive software exchange
- help in solving computer-related problems
- user reviews of Commodore hardware and software
- classes in Basic and machine language programming
- a workshop in Commodore graphics or computer-generated music
- discounts and special sales offered by local software shops
- a place to buy or sell used equipment and software
- a place to advertise the members' computer-related services
- savings on disks and equipment through group buying
- informed advice on finding reliable repair people or computer dealers

Underlying all these material advantages is the best reason of all to join a user's group: to find other people eager to talk about Commodore computers.

You form a user's group in two stages: launching and sustaining. You launch a group by setting an initial meeting place and time, getting this information out to Commodore owners and developing a few basic goals for pointing the group toward a permanent organization. You sustain it by electing officers, establishing policies, opening a bank account, developing projects to unify the membership and keeping the world informed of your group's existence.

A Place to Begin

Don't agonize over when and where your user's group meets the first time. Choose a place that won't cost you money, like a library, a church or a school. Take into consideration the anticipated size of your group. Many computer clubs meet in computer stores, but stores might be cramped. You should allow room for at least 25 to 50 members. Meetings during work hours or on

KATHERINE MAHONEY

weekends are inconvenient for most people, so set a meeting date and time that may suit as many as possible.

With a time and place set, you're ready to advertise. Create a poster that states who (Commodore computer users), what (meeting), why (to organize a club), when (date and time of the meeting) and where (location). If possible, list one or more phone numbers of people who can field questions about the proposed group.

You can use ordinary typing paper and a felt-tip marker, expanded print on a dot-matrix printer or rub-off letters that you can buy from a stationery store. Take your poster to a copying service and have as many copies printed as you're willing to pay for. Save the receipts, and ask your group to reimburse you when you open the club's bank account.

Set up the posters everywhere you can think of. Computer stores, software shops, the electronics section of discount stores, bulletin boards at colleges, apartment houses and laundromats are all good places. First get permission from proprietors or managers of these establishments to post your advertisements; a space is usually set aside for this purpose. These establishments will be more than happy to accommodate you. Don't forget to remove your posters as soon as you hold your first meeting. You will create good will that way, a plus that can only help your club.

Give posters to your friends to put up on company bulletin boards. Distribute posters to libraries and churches. Hand out posters on street corners. Time, energy, manpower and transportation are your only limits.

Use as many free advertising sources as you can. Most newspapers and radio and television stations have free listings to announce local meetings.

Invite newspaper editors or local radio and TV talk show emcees to interview you or someone in your group who won't get stage fright. Find someone who has access to computer bulletin boards, and ask him to post messages about your first meeting. Keep a record of these sources. Posting notices of meetings should be a regular procedure throughout the life of your group.

The First Meeting

Your first user's group meeting might be chaotic, so set a few meeting goals before the big day. Draw up an agenda, and complete the basics in as little time as possible. Leave plenty of time for people to mill around, get acquainted and do what they came for—talk about Commodores.

Try to accomplish as many of the following as you can:

1. Set a date, time and place for the next meeting. Before the first meeting, make a list of possible meeting places and open dates. If possible, settle on a regular meeting time. A consistent meeting time brings in people months after they first hear about the group. It also simplifies notifying your regular members.

2. Persuade or cajole several members into forming the club's steering committee. Members can propose to the group such necessary issues as library policies and by-laws. Keep in mind, though, that user's group meetings are more fun when socializing and learning take up most of the members' time, and business is kept to a minimum.

3. Start a treasury. Your club will need money almost immediately for copying membership lists, buying disks and tapes to start a library and mailing notices of meetings and other events. Without funds, your club will be severely limited in what it can do for its members. Pass the hat, or agree on a temporary dues

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assessment per family. Ask someone on the steering committee to start a bank account on behalf of the group.

4. Establish a way for members to communicate with one another. Since you'll have few funds to do it on your own, have volunteers phone members who need to be reminded of meetings and special events. When you've established the club treasury, you can mail out newsletters to inform members of meetings and events.

5. Pass around a sign-up list requesting members to fill in their names, addresses and phone numbers and to note whether they have a VIC or a C-64, what peripherals they have and what kinds of activities they want to see established in the club. This information affects the kind of software you put in the club's library (disk or tape, VIC or C-64).

In the long run, any club that depends on the efforts of one or two people to keep it going cannot succeed. Decide from the beginning that the manpower necessary to start a user's group must come from its members, or your club will never get off the ground. A user's group succeeds because of a common effort and a general feeling that the club is worth maintaining.

Who's In Charge Here?

Ideally, a group can function on the enthusiasm of its members. But if someone isn't directing that enthusiasm and taking care of club business, the group will dissolve. Give officers minimal but clear responsibility. Meetings that border on chaos are remembered by its members as having been the most enjoyable ones.

Officers directing a Commodore user's group need to be friendly and service-oriented toward members. They also need a sense of humor. Members and would-be members call officers when there is no one else to turn to for help with problems. As a club officer, I sometimes receive calls at 7:00 AM and 11:00 PM from members with problems. Officers don't have to know the answer to every question, but patience and enthusiasm are important qualities for them to possess.

Officer's Guidelines

I recommend the following guidelines for officer responsibilities:

President—chairs the meeting, calls executive meetings, prods other officers and committee chairpersons to see that things get done on time.

Vice-President—coordinates group purchases and also acts as program chairperson.

Secretary—the tie to the outside world; answers mail, sees to meeting notices; if possible, the secretary's phone number is the official phone for local inquiries about the club.

Treasurer—collects and disburses money, sets up simple accounting books, keeps track of membership and any club property.

Librarian—oversees software acquisition and dispersal.

You don't want to have too many officers, but committees might be useful. A membership committee can keep your membership list up to date, develop a database to keep track of inventory, and remind members of meetings and special events. A newsletter committee can sell advertising, solicit news and reviews, and print, fold and mail newsletters. A library committee can make copies of software and magazines, and acquire loaner equipment. When you start the club, one person can run a committee and add members as the need arises.

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mation in a national Commodore magazine. One of your group's first priorities should be to establish a mailing address so the club can be listed in every magazine that publishes user's group lists. (Consider renting a post office box so the club's address doesn't change.) These published addresses get your club on mailing lists, in addition to attracting new members.

Every place in your area that sells Commodore software or equipment should know about your group. Let these businesses know where and when your group meets, the names of one or more officers and a phone number for inquiries. These establishments will consider your club a way to meet customers' needs.

Also, tell the Chamber of Commerce and the public library about your group. Both organizations maintain lists of local organizations. Get your group on as many community calendars in newspapers, radio and TV as possible. Find out if you have to notify them every month, and respect their deadlines.

Your user's group's newsletter is a good way to generate publicity for your club. Charge local advertisers a small fee to help defray printing costs, and distribute free copies to retail stores. Retailers hand out issues to customers, and you get coverage.

User's group members feel good about their club when they become involved in community service projects.

If at first the user's group cannot manage a newsletter, print and distribute a general information sheet. These and other methods will keep the world informed of your group's existence. Use as many different methods as you can generate manpower for.

Great Clubs Are Worth Joining

Software exchange is an important driver of successful user's groups. Making a software exchange work can be a hassle, but let me share some of the ideas we've tried successfully in TACUG that might work for you.

In the beginning, our group's library had copies of tapes and disks available for loan to its members. The library was small, and sometimes members held up exchanges on popular programs for two or three months at a time. We also lost disks and tapes that had been borrowed and never returned.

To solve these problems, we tried a copy party. This was a separate meeting to which some members brought their computers and helped other members copy disks from the club's public domain software. The copy party was popular, but also hectic because it took a while for the disk drives to produce enough copies for the members. But you must take care that your group copies public domain programs only. The group could be held liable if pirated commercial programs are exchanged under its auspices.

Our current solution is to publish a catalog of club library disk inventories. Members choose which disks they want to purchase, fill out an order form and pay the user's fee in advance. The fee covers the cost of the disk and provides a nominal fee for the librarian's time and a small profit for the club. Tapes bring a slightly higher fee because they take more time to copy. We put the library's

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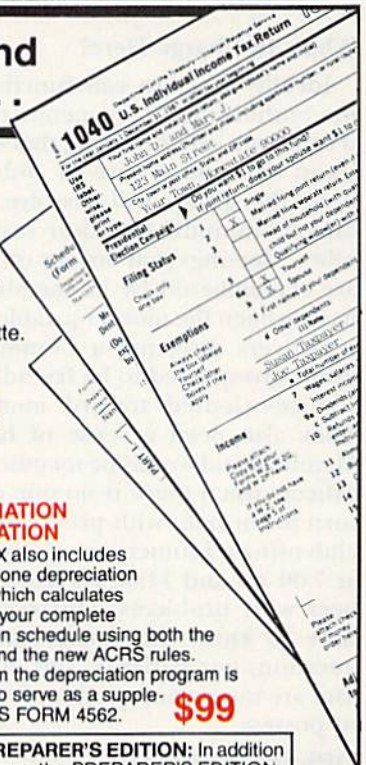

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The Results Are In

The search is over. We have reduced the field to a single printer that meets all our goals (and more). The printer is the GP-550CD from Seikosha, a division of Seiko (manufacturers of everything from wrist watches to space hardware). We ran this printer through our battery of tests and it came out shining. This printer *can* do it all. Standard draft printing up to a respectable (and honest) 86 characters per second, and with a very readable 9 (horizontal) by 8 (vertical) character matrix. At this rate, you will get an average 30 line letter printed in only 28 seconds.

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One of our highest concerns was about print quality and readability. The GP-550CD has a print mode termed Near Letter Quality printing (NLQ mode). This is where the GP-550CD outshines all the competition. Hands down! The character matrix in NLQ mode is a very dense 9 (horizontal) by 16 (vertical). This equates to 14,400 addressable dots per square inch. Now we're talking ***quality*** printing. You can even do graphics in the high resolution mode. The results are the best we've ever seen. The only other printers currently available having resolution this high go for $500 and more *without* the interface or cable needed to hook up to your Commodore!

Features That Won't Quit

With the GP-550CD your computer can now print 40, 48, 68, 80, 96, or 136 characters per line. You can print in ANY of 18 font styles. You not only have the standard Pica, Elite, Condensed and Italics, but also true Superscripts and Subscripts. Never again will you have to worry about how to print H_2O or X^2. This fantastic machine will do it automatically, through easy software commands right from your keyboard. All fonts have true descenders.

One of the fonts we like best is "Proportional" because it looks most like typesetting. The spacing for thin characters like "i" and "l" are given less space which "tightens" the word making reading easier and faster. This is only one example of the careful planning put into the GP-550CD.

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The Best Part

When shopping for a quality printer with all these features, you could expect to pay around $500 or more. *Not any more!* We have done our homework. You don't have to worry about interfaces or cables. Everything is included. We are now able to sell this fantastic printer for **only $259.95!** The GP-550CD is built especially for the Commodore 64, VIC-20, Plus 4 and C-16. All Commodore graphics are included. This printer does everything the Commodore printers do but has more features. **You need absolutely nothing else to start printing–just add paper.** We also have specific models for other computers. Call for details.

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profits back into the treasury to use later to buy disks from other clubs.

Group buys are popular. Members are sometimes offered significant price breaks on disks and tapes if the club buys 100 or more. Look also into books, programming aids and even hardware for group buys. If you buy as a group, you may be able to get discounts from local dealers on items such as printers or modems. Pass most of the savings on to the members, but include a small amount to swell the club treasury. These small amounts can grow into a sizable bank account.

Make your group an avenue through which members can do business. Set aside time at the meetings for announcements of services and equipment for sale. Invite dealers to display their wares. Encourage individuals to leave business cards and flyers in a section of your club that's devoted to giveaway material. Offer members reduced advertising rates in the newsletter. Nothing keeps people coming to meetings like the expectation that they may realize immediate personal benefit.

People enjoy belonging to groups that offer personal improvement or community service. Every meeting should include time for members to ask computer-related questions. Organize classes and seminars that educate members in disk operation, in using word processors or database managers, on programming in Basic or in using Commodore graphics. Charge a small fee, and give most of it to the class instructor.

I have participated in computer-club classes that were free to members, but they don't work in the long run. Students don't treat free classes as seriously as those requiring tuition. Teachers can't afford the time and effort needed to prepare a class lecture unless they are compensated. Members should feel that the time they give to the club is so small as to be negligible and that individual effort is well-rewarded materially and emotionally.

Programs at club meetings should be informative and short in length. If you invite sales people to give presentations, limit their lectures to 20 minutes. The most popular programs in TACUG are informal reviews of newly released hardware and software packages.

If your club spends meeting time on members' questions and announcements, you don't need a formal program every time. You can disseminate to members any information that doesn't cut into the social portion of the meeting. When I don't have a program, I ask club members at meetings to introduce themselves and relate their computing experiences. Sometimes that works better than anything else.

User's group members feel good about their club when they become involved in community service projects. Such projects are powerful springboards for publicity. News media people will bring their cameras and notepads to cover a computer exhibition in a local mall or to cover a project that helps handicapped children to learn by using computers.

Raise funds to acquire computers for your city's schools. Offer free training to teachers. Provide speakers on computer-related subjects for other local groups. Set up a public forum on consumer issues relating to buying computers. Set up a club computer bulletin board. Build a computer float for your town's parade. The possibilities are endless. Anything that has several members working together on a common project solidifies your group.

Afterword

A user's group can be a unique resource for any computer user. Your group might have people who have been using Commodore products since PET days, hardware hackers with electronic know-how and members with experience in every major computer application. At one of our club's meetings, I asked about word processors and spoke with users of eight different such programs before I made a buying choice. Even recruits in a group may bring their special insights or know of a good store for buying disks.

The user's groups of which I am a member are also rich in human experiences. I don't know of any other kind of group in which elder members listen respectfully to the expertise of young members. Computer user's groups foster a value for what its members do rather than for the accidents of age, sex or color. I like to believe that the willingness to learn what another knows before prejudging that person foreshadows a society with fewer and fewer prejudices. R

Address all author correspondence to Annette Hinshaw, PO Box 580635, Tulsa, OK 74158.

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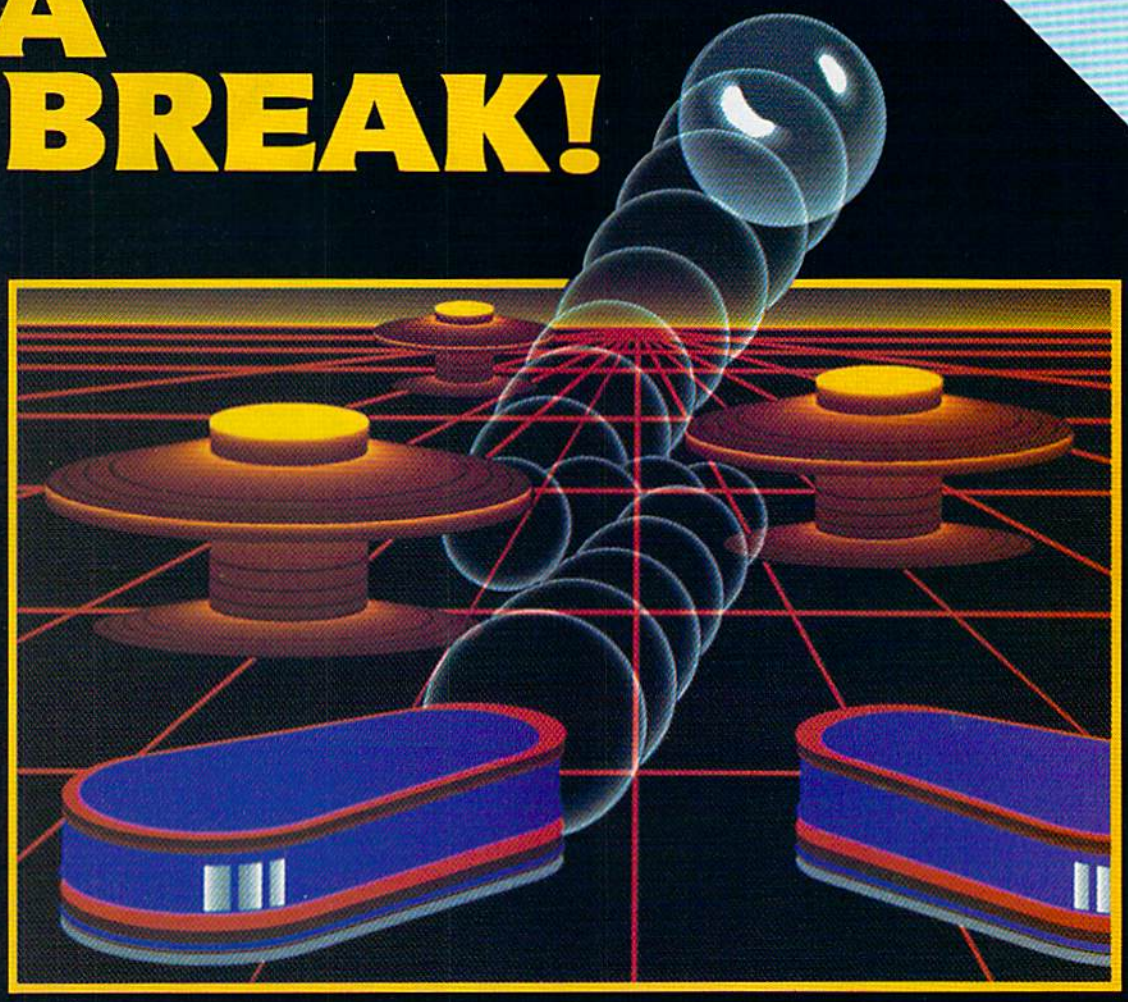
For Commodore 64



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Joystick Joust

By TOM BENFORD

Several joystick combatants are vying for the top spot in a recent reader-preference survey. The results are all in, the votes have been counted, and the winner is . . .

RUN readers were recently asked to submit a vote for their favorite joystick. The results are shown in Table 1.

Votes came from gamesters young and old, male and female (about a 50/50 mix), and from such faraway places as Hawaii and Canada. Thank you all for taking the time to vote for your favorite joystick.

The Joys of Joysticks

When working properly, joysticks are peripherals to which you barely give a second thought, yet they are a principal factor in achieving high scores in your gaming sessions.

Designing a good joystick is quite an engineering feat; it must be light, comfortable, responsive and, most of all, rugged enough to take a lot of hard use and abuse. That's a tall order to fill while still keeping the price reasonable.

Inside the joystick are either switches or contacts. By manipulating the joystick handle, you close or open the circuits governed by the switches or contacts. The fire, or action, button controls the opening or closing of another circuit.

Your computer's operating system checks the joystick port many times each second to read the voltage of the circuits. Depending on the handle's position, the open or closed circuits determine the activity you see on the monitor screen.

All joysticks have at least four switches or contacts, and the more expensive units have at least eight. Think of the contacts inside the stick

ED JUDICE

Prostick III Tri-Fire from Newport Controls

GIM Electronics' Fire Command

Wico's Grip Handle Joystick

as the points of a compass. On your screen, then, north is up, south is down, west is left and east is right.

Angular movement to the upper left from the center of the screen corresponds to the northwesterly direction, to the lower right corresponds to the southeasterly direction, and so on. These angular directions are achieved by depressing two contacts simultaneously. In more complex joysticks, dedicated switches take care of these combined directions.

Which are better, switches or contacts? The answer is switches, since they require less pressure and last longer. Just about anything with moving parts will eventually wear out from the friction generated during use, and friction is the prime enemy of contacts. Switches handle prolonged use much better, but they also cost a bit more than contacts. Consequently, a joystick that uses contacts may sell for six to seven dollars, while a stick with switches will cost $12 and up. How often you use your stick should be the criterion for choosing switches or contacts.

Joysticks come in a variety of sizes, weights and shapes. Before you buy, you should first consider the placement of the action button, how well the stick fits your hands, how tight or loose the action feels, and how heavy it is. Another very important consideration is whether the stick was designed for a right- or left-handed user. Those of you who are left-handed are acutely aware of how right-hand oriented society is. Many manufacturers offer left-hand models, and a few offer models with dual-action buttons for either right- or left-handed players.

The stick's responsiveness during play is a major factor in determining the winner of a game. Excellent hand-eye coordination and lightning-fast reflexes won't do you much good if the stick doesn't quickly respond to your movements. Every gamester has a particular playing style. Some display body language, while others sit poker-faced. Your individual playing style should determine how loose or tight the action should be for you.

To ensure that a stick will be right for you, try testing it in the store, on a game with which you're already familiar. Just playing with the joystick's handle and pressing the fire button without trying it out on a game will tell you nothing. If you can't test the stick in the store, perhaps you could try out those belonging to a few friends.

Many gamesters who sent in their votes were curious as to what joysticks I use, and they asked me to mention my favorite sticks. I use Kraft joysticks 99 percent of the time, preferring the two-button model. The stick is light, small and highly responsive to even the slightest movement. My family and I have had hundreds of hours' use on our joysticks, and we've never had trouble with the Kraft sticks.

Another stick I really like is the Fire Command. It is huge, heavy and

Manufacturer	Products	Votes
Wico Corp. 6400 W. Gross Point Road Niles, IL 60648 (312) 647-7500	Command Control (Bat Handle) "The Boss"	156
Suncom 260 Holbrook Drive Wheeling, IL 60090 (312) 459-8000	TAC II Slik Stik Joy Sensor	114
Kraft Systems PO Box 1268 Vista, CA 92083 (619) 724-7146	Kraft Precision Joystick	86
Diskwasher 1407 N. Providence Road Columbia, MO 65205 (314) 449-0941	Pointmaster Pointmaster Pro	51
Newport Controls 15425 Los Gatos Blvd. Los Gatos, CA 95030 (619) 873-8491	Prostick III Tri-Fire	11
	Other joysticks	20

Table 1. *Results of the joystick survey.*

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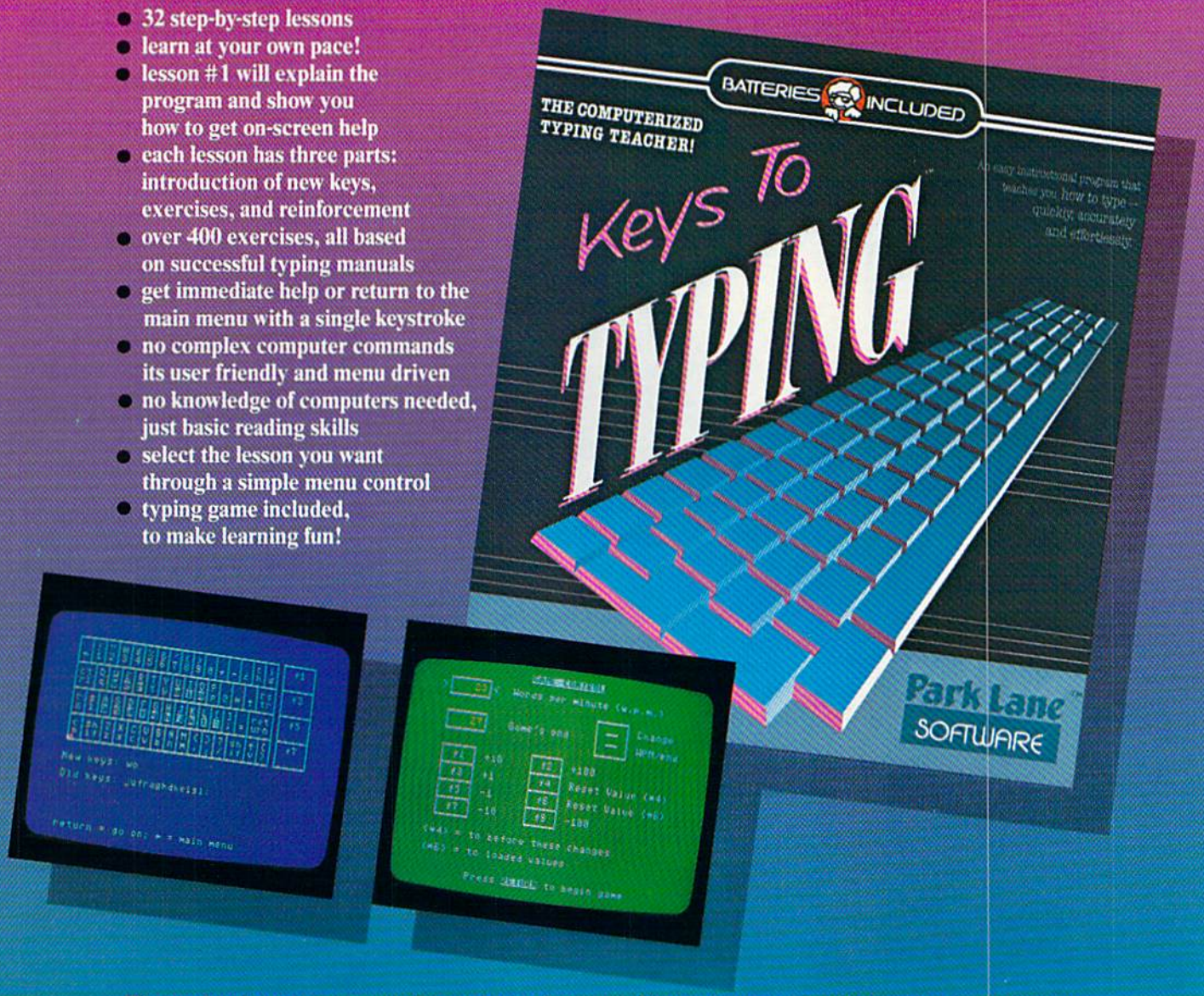
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Excellent hand-eye coordination and lightning-fast reflexes won't do you much good if the joystick doesn't quickly respond to your movements.

Kraft Precision Joystick

Commodore's Joystick

Suncom's TAC-2

Suncom's Slik Stick

a bit looser, but it's perfect for games like Blue Max, where it really imparts the feel of an aircraft joystick.

The Fire Command, by the way, is the most rugged joystick you can buy and probably could survive a lot of abuse without any ill effects. I know someone who accidentally dropped his Fire Command unit out of a fifth-story window, and, though it chipped the concrete sidewalk, the stick itself survived intact and functioned perfectly! The Fire Command is made of steel and has large, arcade-style action buttons. That's what I call a heavy-duty stick. It's also just plain heavy, weighing over five pounds!

Certain games, such as Centipede, offer more competitive play by using a trackball rather than a joystick. From what I've seen, the Wico trackball is the finest unit of its kind, and it really duplicates the play-action of arcade machines. It features full 360-degree movement, allowing infinite directional control. The only bad feature is the left-sided placement of the single action button—a bit inconvenient for left-handed players.

Commodore must be mentioned here for having the worst joystick. Virtually everyone who mentioned the Commodore joystick was negative about it. If you've ever used one, then you're aware of its stiff action and lack of response. I can't help but wonder why Commodore takes great pains to produce excellent gaming software, yet pays little attention to developing a good joystick.

Now let's get on to our joystick showcase. There are so many different brands and models of joysticks that it's not possible for me to review them all in this limited space. Therefore, I'll just cover the favorites that you readers voted for.

The Favorites: Which and Why

The Bat Handle model Command Control joystick was the favorite among Wico users, but other models of this brand, such as The Boss, were also popular. Reasons cited for these Wico sticks' popularity were their responsiveness and tight feel. Many of you liked the top-mounted action button of the Bat Handle, as well as the selector switch for base or top firing.

The Suncom sticks (TAC II and Slik Stick) were also well represented in the poll, with small size and responsiveness given as top reasons for their popularity. One of the voting gamesters, a little girl from Arkansas, said she favored the ball-top on the Suncom sticks because it made the unit easy for her small hands to hold. A few voters picked the Joy Sensor from Suncom.

I was pleasantly surprised to see 86 votes for the Kraft joystick. Those who voted for this stick were the most enthusiastic of all, stating that in most cases they would never go back to a different stick after having used the Kraft.

The Pointmaster and Pointmaster Pro from Diskwasher were also well represented in the poll. Those voters who responded favorably to these units stated that the low price, top-mounted action button and responsiveness made the Pointmasters their favorite joysticks.

The Prostick III Tri-Fire from Newport Controls also has some loyal

Continued on p. 33.

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From p. 30.

users, according to my poll. Prostick fans cite the switchable lock-out gate as being a big plus for use in maze-type games, although no one seemed thrilled about the front-mounted action button.

The remaining votes represented other brands, even some odd-balls like Le Stick, which is no longer manufactured. This stick used mercury switches and required tilting the unit in the appropriate direction to effect movement on the screen.

The standard Atari joystick was mentioned often by voters, all of whom stated that it is a decent stick until it breaks or wears out; such is the mortality rate of sticks that use contacts instead of switches. Another novel configuration, with no stick at all, is the Fingertip Controller, from KY Enterprises. Directional control is achieved through four large buttons, with a red fire button at the upper left corner. The two voters who chose this controller have physical handicaps, and claim that this is an excellent unit for people with very limited hand movement, as it requires only the use of the fingers.

Other Gaming Goodies

There are some other items worth mentioning that might help you to add a few points to your game scores. The Blaster Rapid-Fire Module from Questar Controls will increase the firing speed on some games that have no programming constraints on the number of player missiles that may be on the screen at any one time.

High-Score Ball-Tops from Video Peripherals are ball-shaped knobs that fit on the top of Commodore and Atari joysticks, affording a more comfortable grip to the users of these sticks.

The Stick Stand from K-Byte is a small lap board that accommodates the standard Atari joystick; the unit comes with its own fastball control knob to give you a better grip on the stick.

The Lap Board from Thompson Brothers Enterprises is an all-plastic unit that encases the Atari, Wico and early Commodore joysticks, allowing more leverage during play, as well as providing an arm rest.

Well, that wraps it up for our joystick poll. I hope all your game scores are winning ones! R

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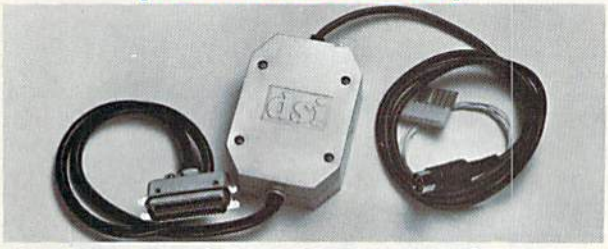

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Ready, Aim,

By MARK E. MELVIN

Do you sometimes become overzealous in your game-playing or drawing, only to discover your joystick is cramping your style? Here's a quick and easy way to put the joy back into that stick—if you own Commodore's model C1311 or Atari's model CX40.

I think it's safe to say that the majority of Commodore computerists use joysticks for game playing and drawing. I don't use my joysticks too often, so I decided to purchase the least expensive one I could find. I bought Commodore's model C1311. I also own an Atari model CX40.

I've found, however, that the C1311 can't endure much zealous game playing with repeated heavy-handedness. Well, these little joysticks only cost between $6 and $12, depending on where you buy them, but throw away two or three of them, and your money and time add up. The Atari model CX40, which is compatible with Commodore machines, exhibits the same problems.

If you own one or both models, you probably know what I'm talking about—the fire-button no longer fires, or you have little or no movement in one or more directions, or the character moves only in one direction and you have no control over it. Although the stick looks fine on the outside, to take it apart would be more trouble than it's worth, right? Wrong!

A Turn of the Screw

I've repaired my C1311 three times since I've gotten it. All it takes is a small Phillips screwdriver (#1), a small slotted-head screwdriver (I use a pocket-sized $^1/_8$-inch head) and about 15 minutes of your time.

Turn the joystick over and remove the four Phillips-head screws and the bottom cover. Take some time to look over the contents before going any further. That way, you won't forget where everything goes when it comes time to reassemble.

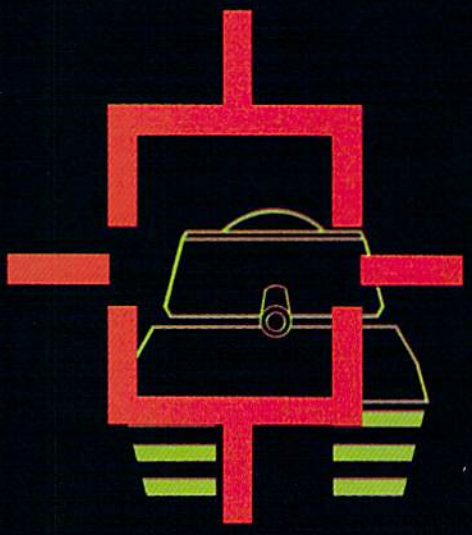
With the bottom cover removed, you are looking at a small board with six wires connected to it. Make sure they are all connected, because the culprit could be as simple as a loose wire. Jot down the color and location of each wire just in case two or more come loose. Now remove the board and turn it over. Make note of the red fire-button and spring and the clear plastic-molded wheel inside the joystick handle; remember their positioning.

Now look at the board (see Figure 1). It consists of five metallic tripods (tripads) with the accompanying runways that go to the wires. The board is covered with a plastic nonconductive tape that holds the tripads in position. It is a very simple, ingenious design and is inexpensively produced (see Figure 2).

As you can see by Figure 2A, the tripad's feet rest on the outer runway, and its center hovers over an inner runway. Each outer runway has a 4.5 voltage level on it and each inner runway has a zero-voltage level on it. Forcing your joystick in the direction of the pad forces the pad down to short the inner runway to the outer runway, causing your screen character to move in that direction.

Now to the heart of the problem. More likely than not, one or more of these tripads have been flattened by your excessive joystick maneuvering. As you can see by the construction of the board, it doesn't take much force to damage one of the pads (see Figures 2B and 2C).

Fire!



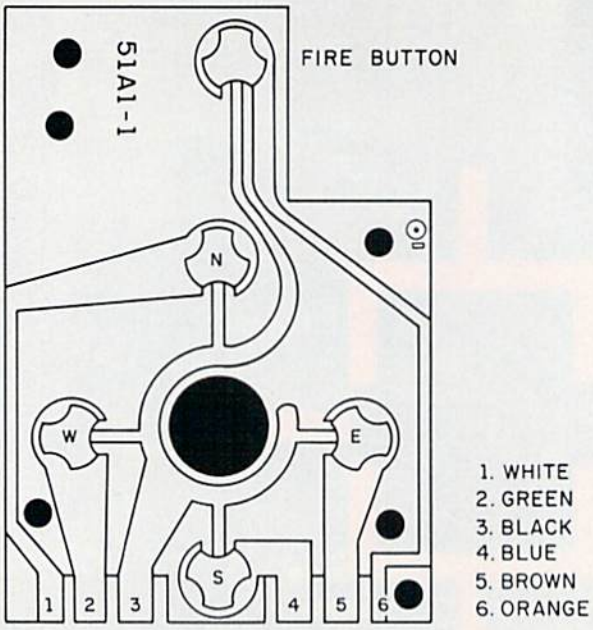
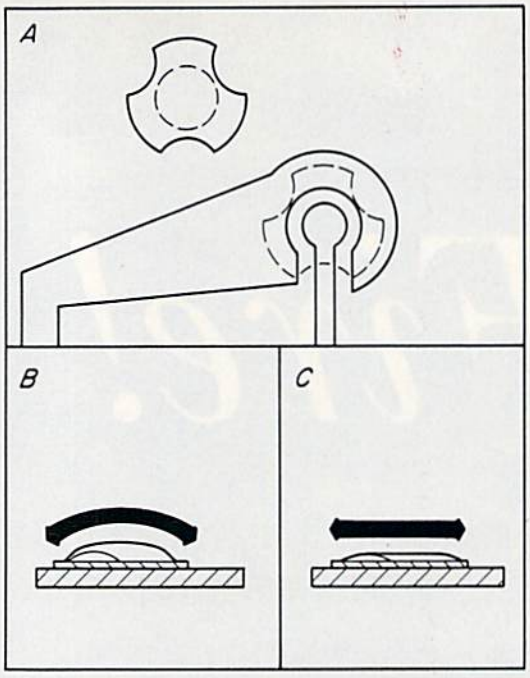


Figure 1. *The actual size of the board, tripads, runways and wire arrangement.*



Figures 2A, B and C. *A shows exploded view of tripad and accompanying runways. B shows normal tripad on runway. C shows flattened tripad.*

Locate the flattened pad (for example, if you don't have fire power, it's the pad located under the fire-button; if you can't move to the left, it's the pad to the left; and so on). Go to the closest edge of the board and work your slotted-head screwdriver under the tape, being careful not to scratch the runways. Work it under the pad, and, holding down the tape around the pad, give the screwdriver a small, careful turn and raise the pad up off the contact (see Figure 3). This should arch the pad so that its feet are touching the runway but its center is slightly raised, as in Figure 2B.

After you are sure that the pad has a convex shape, withdraw your screwdriver and press the tape back in place. Make sure everything is in position and assemble the stick, reversing the steps you followed to take it apart.

That's all there is to it. If everything is in order and you were careful not to scratch through a runway or leave a wire hanging off, your stick should be ready for action. The Atari CX40 has similar internal construction, so you can follow the same procedure. If you ever break a joystick beyond repair, don't throw it away. Save it and salvage it for parts. R

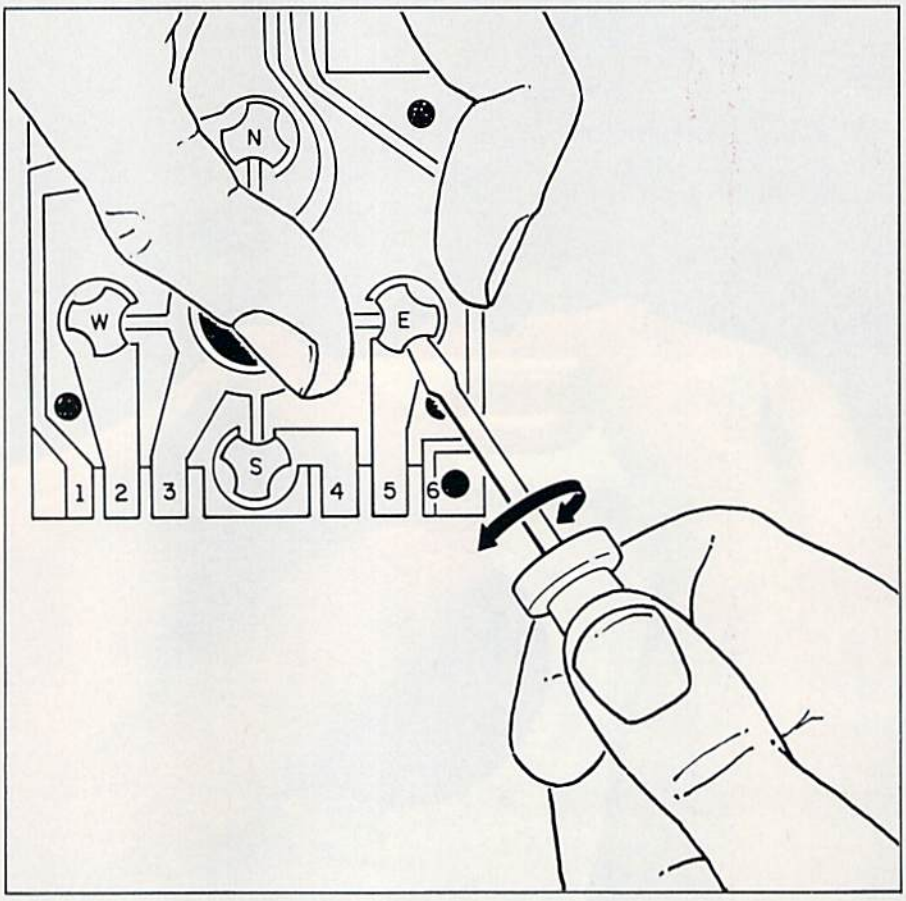


Figure 3. *The repair of a flattened tripad.*

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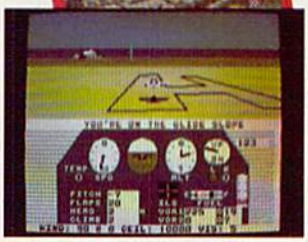

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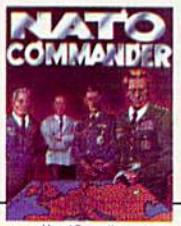

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The *Real Story* Behind Joysticks

This article explains how your computer handles joysticks and provides you with tips and techniques on how to use them in your programs.

By MARK JORDAN

When I first got my Commodore 64, its practical uses were set on the back burner while I took on the exhilarating and exasperating challenge of game writing. Eight weeks later my creation was finished.

"Gee," an unimpressed, so-called friend mumbled after trying it out. "You mean it doesn't even use joysticks?"

He was, I hated to admit, right. A computer game played at the keyboard just isn't as fun as one played with joysticks. Unfortunately for us would-be game creators, figuring out how to program those simple devices isn't easy.

My first attempt to insert a joystick routine into a game had me puzzling over techniques that I had found in the back pages of magazines. Equations such as

```
JV = 15 - (PEEK(56321) AND 15)
```

almost did me in. I could hazily follow Peeks, but this And jazz was too much. And there were parentheses everywhere. The result was that, for a while anyway, all my games were keyboard endeavors.

Sound familiar? Then take heart. What follows is a beginner's guide to writing joystick code. The process hinges on the Peek command and the And command.

Don't let the pleasant sound of these two English words lull you—they are tricky concepts. Learning them, however, offers rewards that extend far beyond joystick code-writing. They are Basic's closest relatives to machine language (along with Poke) and were, for me anyway, stepping-stones into that arcane world.

A Bit of Binary

Before attacking these two fiends, some understanding of how the computer views the joysticks is important. If you have the *Commodore 64 Programmer's Reference Guide*, you may have discovered that joysticks are included in the Input/Output chapter. That is because the reading of joysticks is really a form of input to the computer.

Whether or not you plug in a joystick, the computer will check 60 times a second to see if any information is being input into the machine via this port. It stores this information in one of the 64,000+ memory cells. Every byte (or cell) in your computer has an address. The address for joystick port 1 is 56321. For port 2 it is 56320.

I suggest you write down these addresses, as they'll always tell you what's happening with the joysticks.

As long as nothing is happening with the joysticks, a 1 will be found in each of the first five bits on the joystick bytes. The result of five 1s is 31. If you write 31 in binary, it looks like this: 11111.

The rightmost bit corresponds to the joystick's upward direction. As soon as you push a joystick up, the right digit will switch to a 0 and the value of the bottom five bits of 56321 (or 56320) will change to 30 (11110 in binary).

The second bit from the right corresponds to a downward push. Since a 1 found there equals 2, then a push downward will change your byte's value to 29 (31 minus 2, or 11101 in binary).

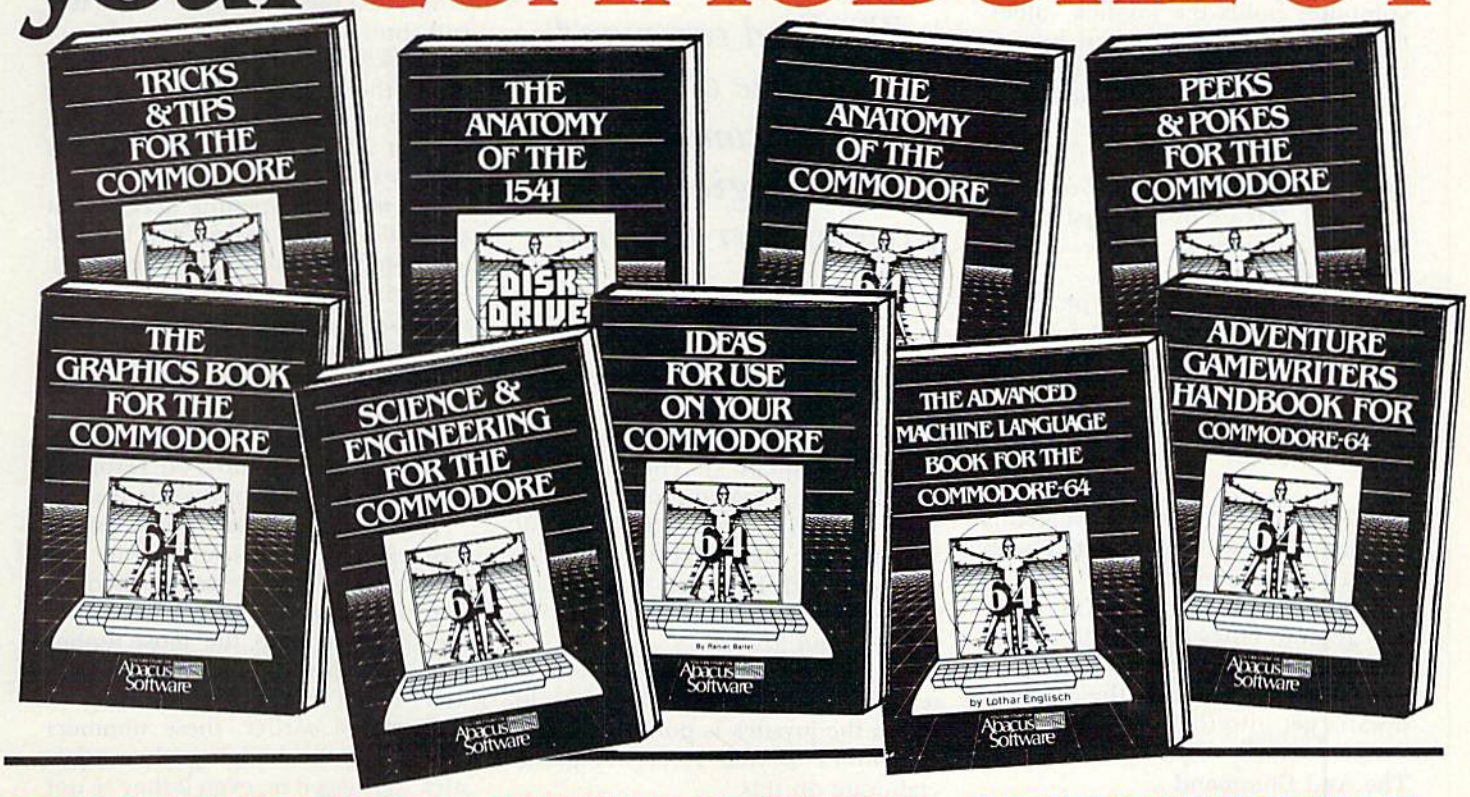
The third bit, with a decimal value of 4, tells you if the joystick is pushed to the left (11011, or 27), and the fourth reveals a rightward push (resulting in 10111, or 23). If the fifth bit turns to 0, you know that the firebutton has been pressed.

If binary logic still doesn't seem very logical to you, read pages 75–78 of your user's guide. The key thing to remember here is that bytes 56320 and 56321 have eight switches (bits) on them, of which the bottom five record what the joysticks are doing. Zeroes in these bits tell us the joystick is up to something.

Stop reading for a moment and type in the following simple routine to see an application of what's going on.

```
10 JV = 31 - (PEEK (56321) AND 31)
20 IF JV = 1 THEN PRINT "UP
30 IF JV = 2 THEN PRINT "DOWN
40 IF JV = 4 THEN PRINT "LEFT
50 IF JV = 8 THEN PRINT "RIGHT
60 IF JV > 15 THEN PRINT "FIRE!
70 GOTO 10
```

Required Reading for your COMMODORE 64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Peeking Around

Now that you understand how the computer holds the joystick values, the next step is to find out how to read them. The Peek command will do just that; it Peeks into whatever memory location you specify. Thus, if you type PEEK (56321), the computer will record the value found for joystick 1. (Please note the parentheses surrounding the address. They are mandatory.)

However, if you only type PEEK (56321), the computer will immediately forget what it has seen. Therefore, you must assign a variable to this value. For example:

```
J1 = PEEK (56321)
```

Now each time you cycle through this statement, J1 will be updated with joystick 1's current value.

That's simple enough. It's when you get into fancy Peeks with sprites and graphics that things get a little tough. Since reading the joystick doesn't get into that, let's continue.

The And Command

What's nice about Peeking the joysticks is that you needn't figure any higher binary numbers than 31. This caused me some confusion in my first attempt to incorporate joysticks' values into my routines. To read only the first five bits, you must separate them from the other three bits on the byte. Basic and machine language offer the same technique for doing this—the And command.

This simple, ubiquitous word is one of the hardest concepts for many beginning programmers to master. Phrases that attempt to explain the concept—logical operators, Boolean truth tables and bit masking—don't help.

To illustrate the use of the And command, imagine that you have just Peeked 56321. Now you will cover up this eight-bit byte with another byte. Think of this new byte as a row of eight windows that fit exactly on top of the joystick byte you've just Peeked. If you assign each window a value of 1, it opens and reveals a bit on our joystick byte below.

Since you want to view only the bottom five bits of 56321, you only

The And command is one of the hardest concepts for the beginning programmer to master.

open windows 0–4 on your cover byte. That equals 31. The And command lays this byte on top of 56321. Since only windows 0–4 are open, all you read are bits 0–4; bits 5, 6 and 7 get turned off. The value that you see through this masked byte will be between 0 and 31.

From this point, it's a simple matter to figure out the direction in which the joystick is pointing. Pages 13 and 14 of your reference guide elaborate on this.

Here's an updated look at your joystick statement:

```
J1 = PEEK (56321) AND 31
```

Now each time you loop through this statement, J1 will tell you what the bottom five bits of 56321 are. If, as is often the case, you only need to check joystick direction and not the firebutton, you should use 15, instead of 31, after the And command, since you are no longer looking at bit 4 (with its value of 16). When you want to check only the firebutton, use:

```
J1 = PEEK (56321) AND 16
```

This opens only window 4 to reveal the firebutton status.

Defining Joystick Values

You must learn one last trick. Programmers often prefer to get an inverse joystick reading. For example,

```
J1 = PEEK (56321) AND 15
```

will return a value of 14 if the joystick is pointing up. It is easier to think of this as a 1, since that relates directly to bit 0. To do so, the statement is altered to read:

```
J1 = 15 - (PEEK (56321) AND 15)
```

This has the added convenience of keeping the result within the 0–10 range, as the accompanying table will show.

Quickly, let's review before looking at the table: joystick up, bit 0 is 0; joystick down, bit 1 is 0; joystick left, bit 2 is 0; joystick right, bit 3 is 0. Now look at Table 1.

See what's happening here? What about those diagonals? Easy. Up and left would leave only bits 1 and 3 on, rendering a value of 10 (15 minus 10 is 5). Up and right would leave only bits 1 and 2 on, giving a value of 6 (15 minus 6 is 9). Down and left would leave bits 0 and 3 on, for a total of 9 (15 minus 9 is 6). Down and right would leave bits 0 and 2 on, resulting in a value of 5 (15 minus 5 is 10).

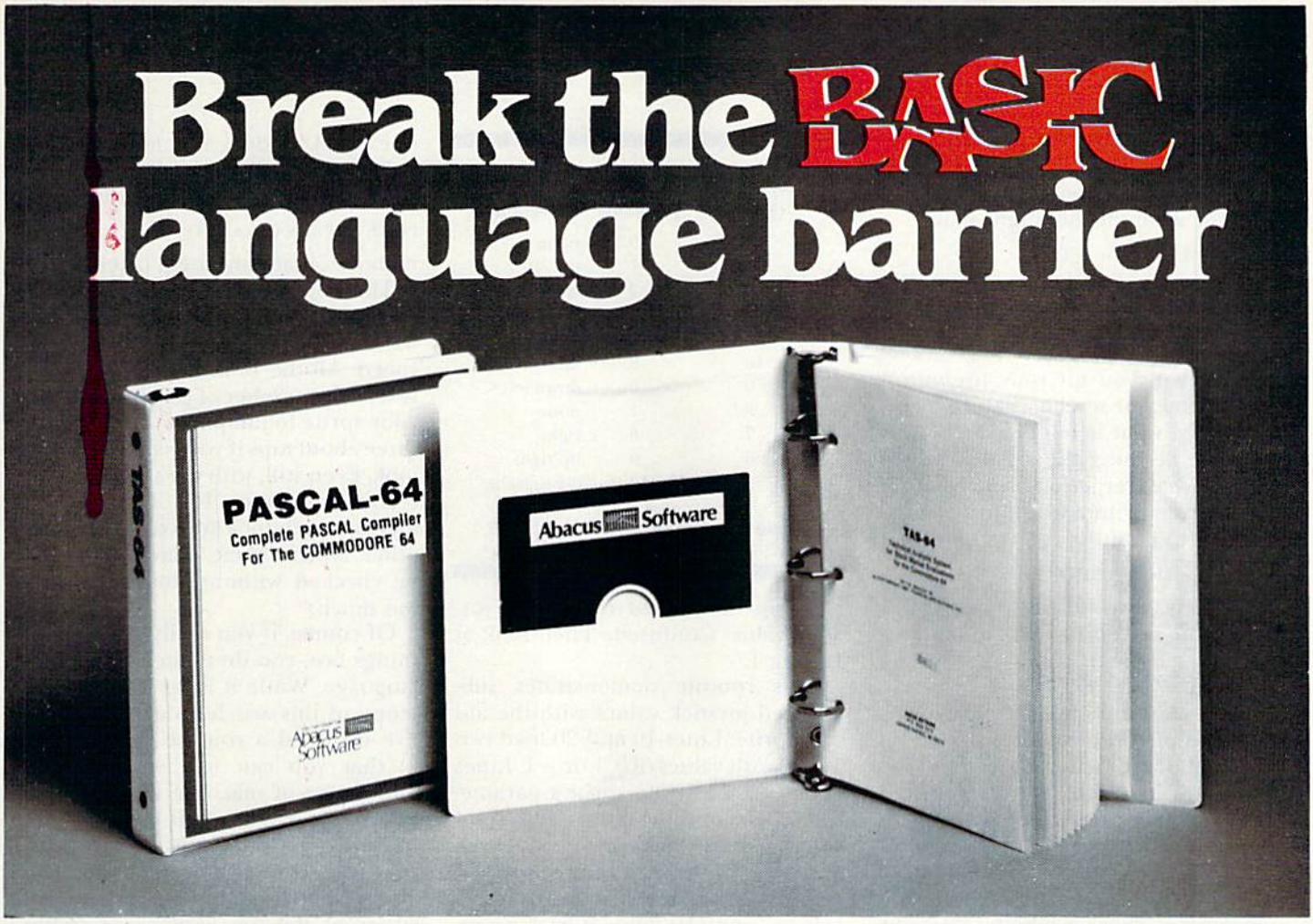
Values under 5 are not possible. (For example, a 4 would mean that the joystick was being pushed in every direction but left, a feat beyond the scope of even the most limber joystick.) Also note, values 12 and 8 don't result in any direction.

As stated earlier, these numbers are constantly changing when a joystick is plugged in, even if they're not read. They are updated 60 times a second, often enough for you to check and perform whatever you want. What comes after reading this value? Using it. Try this simple routine to watch it work.

```
10 POKE 53281,0: PRINT "{CLR/HOME}":
   POKE 53281,1
20 X = 1490: J1 = 56321
30 POKE X, 81
40 JV = 15 - (PEEK (J1) AND 15)
50 IF JV = 4 THEN X = X - 1: POKE
   X + 1, 32
60 IF JV = 8 THEN X = X + 1: POKE
   X - 1, 32
100 GOTO 30
```

If you typed everything in correctly, you should be able to manipulate a ball from side to side on your screen with your joystick plugged into port 1. True, it is a blurry ball at best, but it does demonstrate how simple it is to use a joystick. Any directional positioning other than left or right will not be read. This is because if the result from your reading the joystick in lines 40 and 50 isn't a 4 or 8, then the program does nothing but loop back to check again.

Break the BASIC language barrier



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You could easily make the diagonals also move you left and right by adding those conditions to lines 50 and 60. For example, 50 might read:

```
IF JV = 4 OR JV = 6 THEN...
```

Or you could add a line 70 to read:

```
(IF PEEK (56321) AND 16) = 0 THEN POKE 53281,0
```

Now, when you hit your firebutton at any time, the screen will turn black. Basically, what is happening here is you are defining the joystick. It can cause whatever effect you want. It could even print a word. Just change line 50 to read:

```
IF JV = 1 THEN PRINT "OUCH!"
```

Now any upward movement will cause the screen to react in pain.

Getting Sophisticated

You can and should experiment with simple little routines like those listed above to better understand the concepts involved. However, you'll find in game design, especially in Basic, that this type of routine is often too slow, particularly when you have a lot of If...Then statements inside your loop. There is a better way, but it isn't as clear-cut as the previous example.

A more sophisticated routine would not list a bunch of IF-joystick-equals-this-THEN-do-that statements. Instead, the results of a joystick Peek would feed immediately into a subscripted variable whose action would have been already defined. Here's how it works.

At the top of the program, read the actions you wish each push of the joystick to take into a variable whose subscript is the corresponding joystick value. Confused? Then look at Listing 1.

Joy Value (56321)	15 minus Joy Value	Direction
15	0	none
14	1	up
13	2	down
12	3	none
11	4	left
10	5	up-left
9	6	down-left
8	7	none
7	8	right
6	9	up-right
5	10	down-right

Table 1. *Joystick Peek value equivalents.*

This routine demonstrates subscripted joystick values with the aid of a sprite. Lines 10 and 20 load two arrays with values of 0, 1 or −1. Lines 40–60 establish the sprite's parameters (it'll be nothing more than a solid square). Line 80 reads the joystick and line 100 Pokes your sprite's X and Y coordinates with the joystick's values. Line 110 loops it back again.

Study this little gem of a technique. Notice there are no If...Then statements. They were avoided by inserting the joystick value into subscripted variables within Poke statements. For example, if your joystick had been pointing up, line 80 would have assigned a 1 to JV. Line 100 would then have inserted that 1 into both A( ) and B( ). A(1) equals −1. Poke V + 1 (your Y coordinate) with itself plus the negative one of A(1), and the sprite moves up the screen one pixel. It does not move diagonally because B(1) is a 0, and since you add that to your X coordinate in

```
POKE V, PEEK (V) + B(1)
```

no horizontal movement takes place.

This routine, as is, runs quite fast. It is one good way to allow you to write games in Basic with enough speed. All the 1s in the routine represent the number of pixels you want your sprite to jump at a time—I find three about tops if you want a smooth look. Even still, with the speed of this technique, many If...Then statements, which look for collisions and other typical game conditions, can be checked without slowing things too much.

Of course, if you really want to do things fast, you do them in machine language. While it is far beyond the scope of this article to explain that, I've included a routine (see Listing 2) that you can use, without any knowledge of machine language, to move things around. It does not include firebutton status. To use this routine within your program, include line 10 and the data lines somewhere at the top of your program and put a SYS 49152 into your main program loop. The example program does so. Study it to understand it completely.

If this is still too complex for you, don't fret. Just try the routines as they are listed; become familiar with them, and soon you'll be using joysticks in your games like a pro. R

Address all author correspondence to Mark Jordan, 70284 C.R. 143, Ligonier, IN 46767.

Listing 1. *A routine that demonstrates subscripted joystick values with the aid of a sprite.*

```
10 FOR T=1 TO 10: READ A(T): READ B(T): NEXT
20 DATA -1,0,1,0,0,0,0,-1,-1,-1,1,-1,0,0,0,1,-1,1,1,1
40 V = 53248: FOR T = 12288 TO 12350: POKE T,255: NEXT
50 POKE 2040, 192: POKE V, 100: POKE V + 1, 100
60 POKE V + 39, 12: POKE V + 21, J1: J1 = 56321
80 JV = 15 - (PEEK (J1) AND 15)
100 POKE V, PEEK (V) + B(JV): POKE V + 1, PEEK (V + 1)
  + A (JV)
110 GOTO 80
```

Listing 2. *Machine language routine that you can use with your game programs to speed them up.*

```
10 FOR T = 49152 TO 49204: READ A: POKE T, A: NEXT
40 FOR T = 12288 TO 12350: POKE T, 255: NEXT: V = 53248
50 POKE 2040, 192: POKE V, 100: POKE V + 1, 100
60 POKE V + 39, 12: POKE V + 21, 1: J1 = 56321
100 SYS 49152
110 GOTO 100
200 DATA 173, 1, 220, 41, 15, 201, 14, 240, 15, 201, 13, 240, 18
210 DATA 201, 11, 240, 21, 201, 7, 240, 24, 76, 0, 192, 206, 1, 208
220 DATA 206, 1, 208, 96, 238, 1, 208, 238, 1, 208, 96, 206, 0
230 DATA 208, 206, 0, 208, 96, 238, 0, 208, 238, 0, 208, 96, 0
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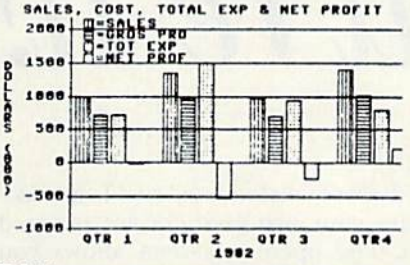

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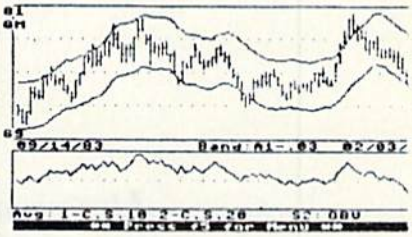

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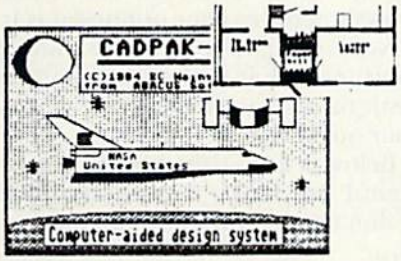

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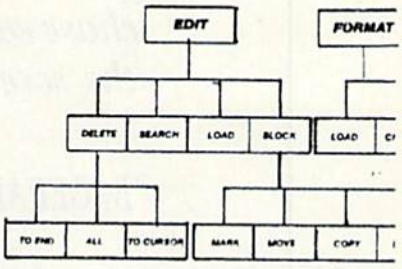

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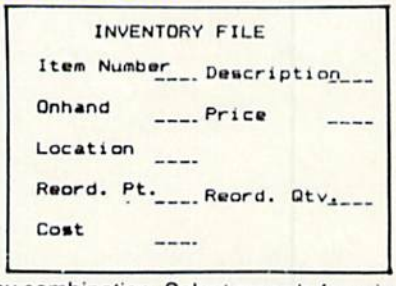

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Note that there are two hiding spots located at the top and bottom sections of the screen. Use them to your advantage.

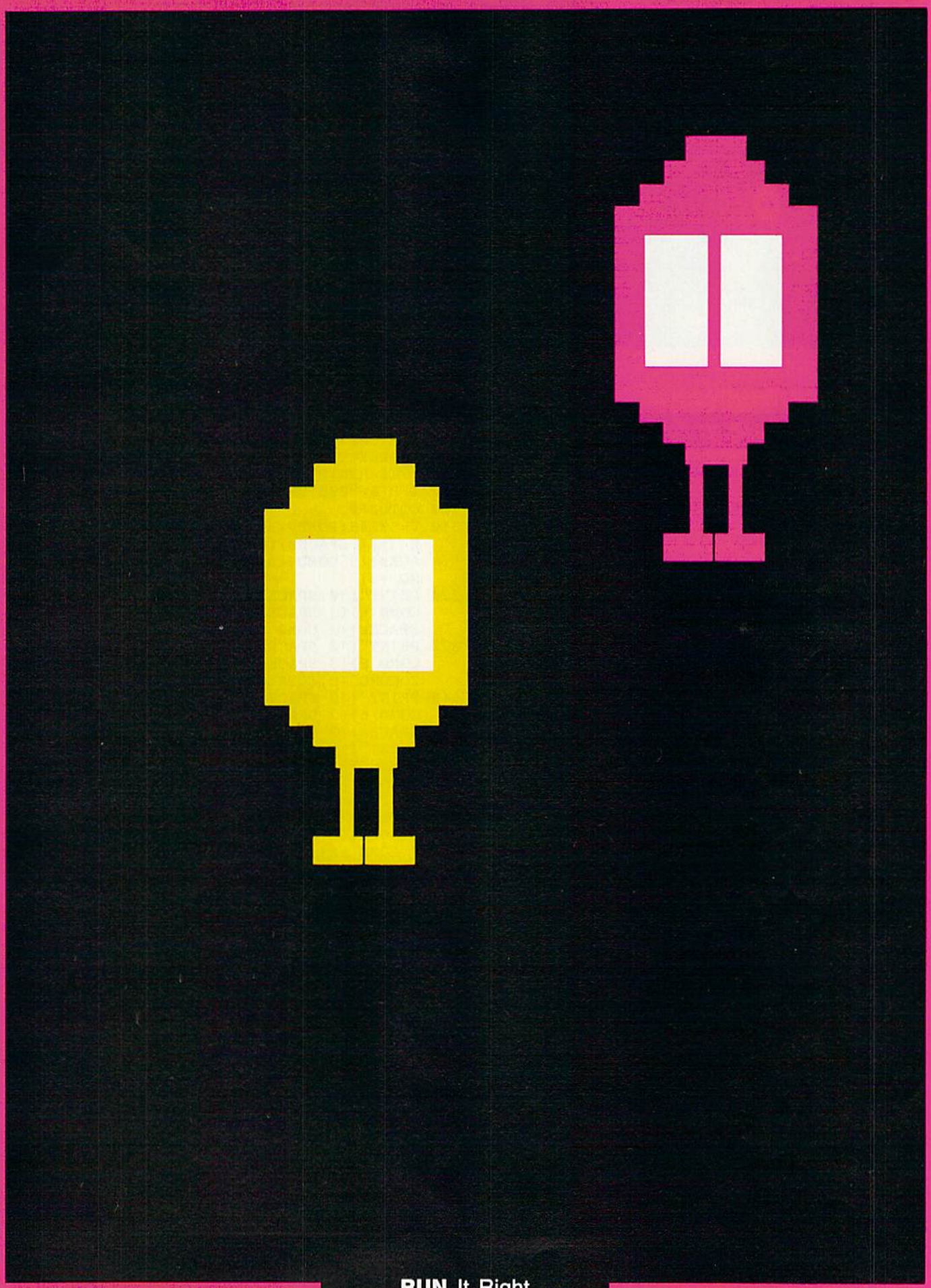
Below is a disassembly of the program I use. If you don't understand it, don't worry. Just have fun playing.

```
49152   sei          (you must do this!)
49153   lda  789
49156   cmp  #234
49158   bne  49173
49160   lda  #33
49162   sta  788
49165   lda  #192
49167   sta  789
49170   jmp  49183
49173   lda  #49
49175   sta  788
49177   lda  #234
49180   sta  789
49183   cli
49184   rts
49185 (your machine language subroutine goes here)
```

Remember to jmp 59953 at the end! And do not Poke locations 788 or 789 in Basic.

If you can't seem to type the program in correctly, or you just don't want to do it, send me $2, a self-addressed stamped envelope and a blank tape, and I'll send you a copy. R

Address all author correspondence to Gerald Coddington, Rt. 3 Box 296, Gilmer, TX 75644.



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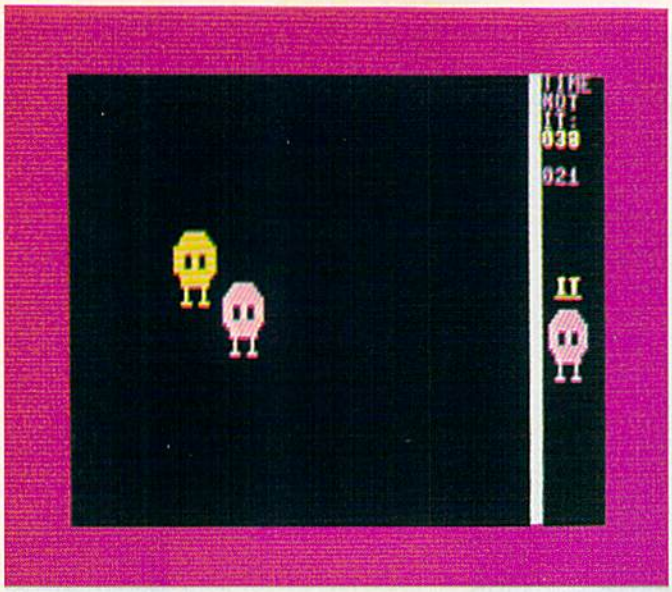
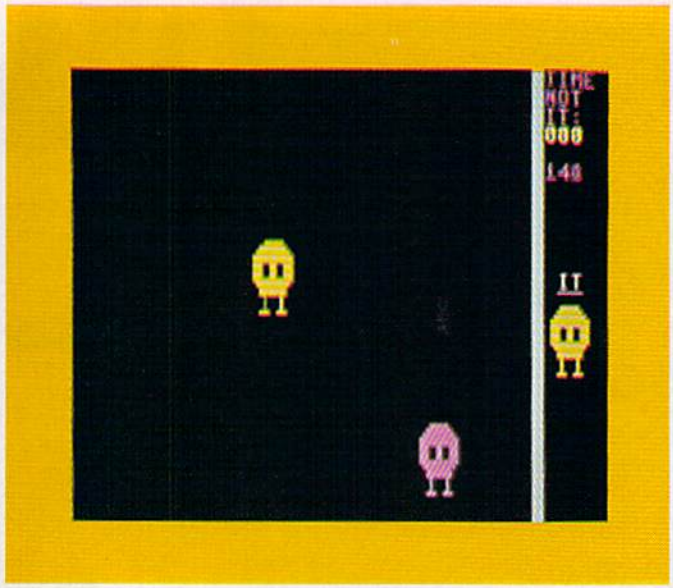
Two joysticks





Listing 1. *Tag Program.*

```
 1 REM TAG PROGRAM BY GERALD CODDINGTON (214
  -725-5489)
1Ø PRINTCHR$(142):PRINTCHR$(8):POKE5328Ø,Ø:
   POKE53281,Ø:SR=1:GOTO9Ø
2Ø POKEV+16,16:POKEV+43,FF:POKEV+8,4Ø:POKEV
   +9,15Ø
3Ø PRINT"{HOME}{11 CRSR DNs}{28 SPACEs}{4 C
   RSR RTs} {3 CRSR RTs}IT";
4Ø PRINT"{32 SPACEs}{5 CRSR RTs} {2 COMD Ts
   }"
5Ø PRINT"{HOME}{33 SPACEs}{2 CRSR RTs}TIME{
   CRSR DN}{4 CRSR LFs}NOT{CRSR DN}{3 CRSR
   LFs}IT";
55 PRINT":{CRSR DN}{3 CRSR LFs}"RIGHT$(TI$,
   3)
6Ø IFH1$>"ØØØ2ØØ"ORH2$>"ØØØ2ØØ"THEN62Ø
7Ø FORL=54272TO54296:POKEL,Ø:NEXT:S=54272
8Ø POKES+24,15:POKES+19,138:POKES+15,XX:POK
   ES+18,17:POKEV+3Ø,Ø:RETURN
9Ø PRINT"{SHFT CLR}":FF=5:POKE5328Ø,254:TI$
   ="ØØØØØØ":H1$="ØØØØØØ":H2$="ØØØØØØ"
1ØØ V=53248:X=15:Y=47:Z=255:POKEV+3Ø,Ø:
11Ø POKEV+21,19
12Ø POKE2Ø4Ø,13:POKE2Ø41,13:POKE2Ø44,13
13Ø POKEV+23,255:POKEV+29,255
14Ø FORN=ØTO62:READQ:POKE832+N,Q:NEXT:GOTO9
   ØØ
15Ø POKEV+39,2:POKEV+4Ø,5
16Ø IFSR=1THEN31Ø
17Ø POKEV+Ø,255:POKEV+1,215:POKEV+2,15:POKE
   V+3,47:POKE5328Ø,5
18Ø FORI=1TO25:PRINT"{34 CRSR RTs}{CTRL 9}{
   COMD 5} ":NEXT:Q=215
19Ø GOSUB2Ø
2ØØ POKE2Ø18,16Ø
21Ø IFFF=2THENH1$=TI$
22Ø PRINT"{HOME}{33 SPACEs}{2 CRSR RTs}TIME
   {CRSR DN}{4 CRSR LFs}NOT{CRSR DN}{3 CRS
   R LFs}IT";
225 PRINT":{CRSR DN}{3 CRSR LFs}{COMD 6}"RI
   GHT$(H1$,3)
23Ø IFH1$>"ØØØ199"ORH2$>"ØØØ199"THEN62Ø
24Ø IFPEEK(V+3Ø)AND3=3ANDFF=5THENFF=2:XX=3Ø
   :TI$=H1$:POKE5328Ø,2:GOSUB2Ø
25Ø IFFF=5THENH2$=TI$
26Ø PRINT"{CTRL 3}"
27Ø PRINT"{HOME}{33 SPACEs}{2 CRSR RTs}TIME
   {CRSR DN}{4 CRSR LFs}NOT{CRSR DN}{3 CRS
   R LFs}IT";
275 PRINT":{CRSR DN}{3 CRSR LFs}{2 CRSR DNs
   }"RIGHT$(H2$,3)
28Ø IFPEEK(V+3Ø)AND3=3ANDFF=2THENFF=5:XX=68
   :TI$=H2$:POKE5328Ø,5:GOSUB2Ø
29Ø IFH1$>"ØØØ199"ORH2$>"ØØØ199"THEN62Ø
3ØØ GOTO21Ø
31Ø V=53248:POKEV+3Ø,Ø:PRINT"{SHFT CLR}{CTR
   L 3}{7 SPACEs}{8 COMD +s} {COMD 6}{2 SP
   ACEs}{5 COMD +s}{CTRL 3}{3 SPACEs}{7 CO
   MD +s}
32Ø PRINT"{1Ø SPACEs}{2 COMD +s}{2 SPACEs}{
   COMD 6}{3 SPACEs}{7 COMD +s}{CTRL 3}{2
   SPACEs}{2 COMD +s}
33Ø PRINT"{1Ø SPACEs}{2 COMD +s}{2 SPACEs}{
   COMD 6}{3 SPACEs}{2 COMD +s}{3 SPACEs}{
   2 COMD +s}{CTRL 3}{2 SPACEs}{2 COMD +s}
34Ø PRINT"{1Ø SPACEs}{2 COMD +s}{2 SPACEs}{
   COMD 6}{3 SPACEs}{7 COMD +s}{CTRL 3}{2
   SPACEs}{2 COMD +s}{2 SPACEs}{3 COMD +s}
35Ø PRINT"{1Ø SPACEs}{2 COMD +s}{2 SPACEs}{
   COMD 6}{3 SPACEs}{2 COMD +s}{3 SPACEs}{
   2 COMD +s} {CTRL 3} {2 COMD +s}{3 SPACE
   s}{2 COMD +s}
36Ø PRINT"{1Ø SPACEs}{2 COMD +s}{2 SPACEs}{
   COMD 6}{3 SPACEs}{2 COMD +s}{3 SPACEs}{
   2 COMD +s} {CTRL 3} {7 COMD +s}
37Ø PRINT"{CTRL 2}{CRSR DN}{11 SPACEs}BY GE
   RALD{2 SPACEs}CODDINGTON"
38Ø PRINT"{3 CRSR DNs}"TAB(4)"DO YOU NEED I
   NSTRUCTIONS? Y OR N"
39Ø AA=-35:FORI=35TO245
4ØØ POKEV+Ø,I:POKEV+1,18Ø
41Ø POKEV+2,I-AA:POKEV+3,18Ø
42Ø GETA$:IFA$=""THEN45Ø
43Ø IFA$="N"THENRESTORE:CLR:GOTO9Ø
44Ø IFA$="Y"THEN77Ø
45Ø AA=AA+.Ø7:POKEV+3Ø,Ø
46Ø IFPEEK(V+3Ø)AND3=3THENPRINT"{HOME}{15 C
   RSR DNs}"TAB(22)"GOT YOU!":GOTO48Ø
47Ø NEXT
48Ø FORI=1TO1ØØØ:NEXT:PRINTTAB(11)"{2 CRSR
   UPs}YEA BUT NOW I AM CHASING YOU!"
49Ø AA=-3Ø:FORI=1TO18ØØ:NEXT:PRINT"{2 CRSR
   UPs}{4Ø SPACEs}"
5ØØ PRINT"{CRSR UP}{36 SPACEs}"
51Ø FORI=245TO35STEP-1
52Ø POKEV+Ø,I+AA:POKEV+1,18Ø
53Ø POKEV+2,I:POKEV+3,18Ø
54Ø GETA$:IFA$=""THEN57Ø
55Ø IFA$="N"THENRESTORE:CLR:GOTO9Ø
56Ø IFA$="Y"THEN77Ø
```

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Circle 9 on Reader Service card.

Listing 1 continued.

```
57Ø POKEV+3Ø,Ø
58Ø IFPEEK(V+3Ø)AND3=3THENPRINTTAB(9)"{CRSR
    UP}DARN YOU GOT ME.":GOTO61Ø
59Ø AA=AA+.Ø6
6ØØ NEXT
61Ø FORI=1TO1ØØØ:NEXT:PRINT"{CRSR UP}{38 SP
    ACEs}{CRSR UP}":RUN31Ø
62Ø FORI=VTOV+9:POKEI,Ø:NEXT:PRINT"{SHFT CL
    R}{14 SPACEs}{COMD 5}GAME OVER"
63Ø PRINT"{3 CRSR DNs}TIME:{2 CRSR DNs}":PR
    INT"{COMD 6}PLAYER 1 TIME-"H1$:PRINT"{2
     CRSR DNs}{CTRL 3}PLAYER 2 TIME-"H2$
64Ø HS=1:IFH2$>H1$THENHS=2
65Ø PRINT"{CRSR DN}{CTRL 2}PLAYER"HS"WINS!"
66Ø PRINT"{1Ø CRSR DNs}PRESS BUTTON ON JOYS
    TICK 1 TO PLAY AGAIN{CRSR LF}{CRSR UP}"
67Ø WAIT56321,16,16:CLR:RESTORE:GOTO9Ø
68Ø END
69Ø RESTORE:CLR:GOTO9Ø
7ØØ DATAØ,Ø,Ø,Ø,126,Ø,Ø,255,Ø
71Ø DATA1,255,128,3,255,192,3,255,192
72Ø DATA3,153,192,3,153,192,3,153,192
73Ø DATA3,255,192,1,255,128,Ø,255,Ø
74Ø DATAØ,255,Ø,Ø,66,Ø,Ø,66,Ø
75Ø DATAØ,66,Ø,Ø,231,Ø,Ø,Ø,Ø
76Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
77Ø FORI=VTOV+9:POKEI,Ø:NEXT:PRINT"{SHFT CL
    R}{CTRL 2}"TAB(12)"WELCOME TO TAG!"
78Ø PRINT"{CRSR DN}{COMD 3} THE OBJECT OF T
    HE GAME IS TO NOT BE{4 SPACEs}"CHR$(34)
    "IT"CHR$(34);
79Ø PRINT" FOR 2 MINUTES. THE FIRST PERSON{
    4 SPACEs}TO DO SO WINS."
8ØØ PRINT"{CRSR DN}{COMD 4} YOU GET THE OTH
    ER PERSON "CHR$(34)"IT"CHR$(34)" BY "
81Ø PRINT"RUNNING IN";
82Ø PRINT"TO HIS MAN. WHEN YOU DO,{6 SPACEs
    }YOUR TIMER STARTS COUNTING. IF THE "
83Ø PRINT"OTHER PERSON TAGS YOU BACK THEN Y
    OUR{4 SPACEs}TIMER STOPS AND HIS STARTS

84Ø PRINT"THIS KEEPS GOING ON UNTIL ONE OF
    THE":PRINT"TIMERS REACHES 2 MINUTES"
85Ø PRINT"{COMD 6}{CRSR DN} THIS GAME REQUI
    RES TWO JOYSTICKS,ONE{3 SPACEs}TO MOVE
    EACH MAN."
86Ø PRINT"{COMD 7}{CRSR DN} IF YOU FORGET W
    HO IS IT,LOOK UNDER{5 SPACEs}THE TIMERS
    ";
87Ø PRINT"OR AT THE BORDER COLOR.":PRINT"{2
     CRSR DNs}{COMD 8}"TAB(7)"GOOD LUCK TO
    BOTH OF YOU!"
88Ø PRINT"{CTRL 2}{CRSR DN}{3 SPACEs}{CTRL
    9}PRESS BUTTON ON JOYSTICK 1 TO PLAY"
89Ø GOTO67Ø
9ØØ FORADRES=49152TO493Ø5:READDATTA:POKEADR
    ES,DATTA:NEXTADRES
9Ø9 REM***DATA FOR MACHINE LANGUAGE***
91Ø DATA 12Ø, 173, 21, 3, 2Ø1, 234
92Ø DATA 2Ø8, 13, 169, 33, 141, 2Ø
93Ø DATA 3, 169, 192, 141, 21, 3
94Ø DATA 76, 31, 192, 169, 49, 141
95Ø DATA 2Ø, 3, 169, 234, 141, 21
96Ø DATA 3, 88, 96, 173, Ø, 22Ø
97Ø DATA 2Ø1, 123, 24Ø, 15, 2Ø1, 119
98Ø DATA 24Ø, 2Ø, 2Ø1, 126, 24Ø, 25
99Ø DATA 2Ø1, 125, 24Ø, 3Ø, 76, 94
1ØØØ DATA 192, 2Ø6, Ø, 2Ø8, 2Ø6, Ø
1Ø1Ø DATA 2Ø8, 76, 94, 192, 238, Ø
1Ø2Ø DATA 2Ø8, 238, Ø, 2Ø8, 76, 94
1Ø3Ø DATA 192, 2Ø6, 1, 2Ø8, 2Ø6, 1
1Ø4Ø DATA 2Ø8, 76, 94, 192, 238, 1
1Ø5Ø DATA 2Ø8, 238, 1, 2Ø8, 238, 7
1Ø6Ø DATA 2Ø8, 76, 94, 192, 173, 1
1Ø7Ø DATA 22Ø, 2Ø1, 251, 24Ø, 15, 2Ø1
1Ø8Ø DATA 247, 24Ø, 2Ø, 2Ø1, 254, 24Ø
1Ø9Ø DATA 25, 2Ø1, 253, 24Ø, 3Ø, 76
11ØØ DATA 49, 234, 2Ø6, 2, 2Ø8, 2Ø6
111Ø DATA 2, 2Ø8, 76, 49, 234, 238
112Ø DATA 2, 2Ø8, 238, 2, 2Ø8, 76
113Ø DATA 49, 234, 2Ø6, 3, 2Ø8, 2Ø6
114Ø DATA 3, 2Ø8, 76, 49, 234, 238
115Ø DATA 3, 2Ø8, 238, 3, 2Ø8, 76
116Ø DATA 49, 234, 96, Ø,Ø,Ø
117Ø IFPEEK(789)=234THENSYS49152
118Ø GOTO15Ø
```


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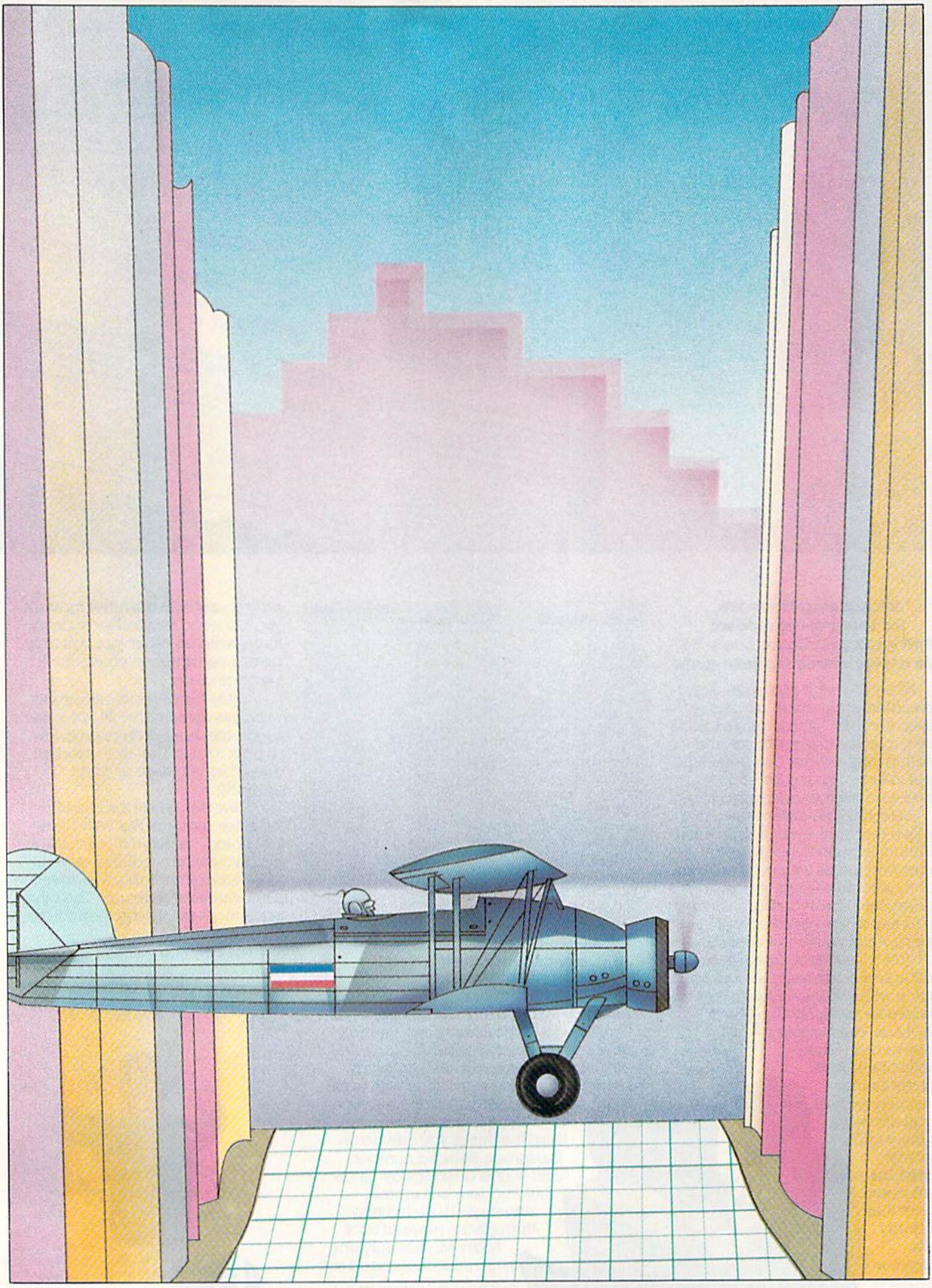


PHIL GERACI

Can you successfully fly your delta-winged aircraft off the airfield and into this narrow canyon without crashing into the treacherous rocky walls or oncoming planes? Type in this VIC program to meet the challenge.

Fly the Grand Canyon

By THOMAS H. SIMMONDS, JR.

Fly Grand Canyon is an arcade-type, joystick-operated game for the unexpanded VIC-20. You must take off from the airfield and fly through the canyon without hitting walls or planes. If you accrue 2460 points while doing so, YOU MADE IT appears on the screen. Four levels of difficulty are available. They range from a short (S) and possible (P) to a long (L) and impossible (I) game. No one I know of has completed the most difficult level, as the game is programmed.

Program Description

The program is written in Basic, with careful attention to the structure of the main game loop to make it as fast as possible. Because of the limited available memory of the unexpanded VIC-20, the program is loaded in two parts:

Listing 1 presents the instructions and Pokes into memory the data for the 60 custom characters. As a final step, the 512 bytes of custom-character memory are protected, and Listing 2, the main program, is loaded and run by using Pokes to the keyboard buffer.

Listing 2 consists of three main sections: initialization, the airport and the canyon maneuvers. The airport portion of the game, which is in a subroutine located at the end of the program, consists of initialization, airport Print statements and plane maneuvers. The next part contains canyon initialization, the fly-the-canyon loop, the crash and explosion and the score-keeping routines.

To load the programs, first type in Listing 1. If you are to save the programs on disk, omit line 120 and remove the REM statements in lines 140 and 150.

To ensure accuracy in the custom characters used in the airport and canyon scenes, be careful when entering the Data statement. Save the program before running it.

Second, enter Listing 2, saving it with the name "F0" if you are using a disk. If you are using tape, save Listing 2 di-

RUN It Right

Unexpanded VIC
Tape or disk

rectly after Listing 1. That way, when Listing 1 is run, it will automatically load and run Listing 2.

The following is a more detailed outline of Listing 2 and a description of the game loop.

Initial Setup

The necessary initial parameters are set up in three areas of the program: at the beginning, to establish the level of difficulty and the screen color, and to activate the custom characters; in the airport subroutine, to establish the Print statements that use the custom characters to create the airport, then to determine the sound, the joystick constants and the initial position of the plane; in the canyon routine, to set up the array dimensions, Print strings and initial position of the canyon opening and plane.

In the airport subroutine, the plane is Poked to the screen, the joystick direction is detected, and the plane is moved accordingly. If. . .Then statements are included to determine whether the plane is within the screen boundary, to detect whether it has run into any forbidden objects in the airport and, finally, to see whether the plane is headed south to the canyon. When this latter condition is true, the control of the plane is passed to the canyon-flying part of the program. The canyon loop is programmed separately to maximize its speed, as you will see presently.

The Canyon

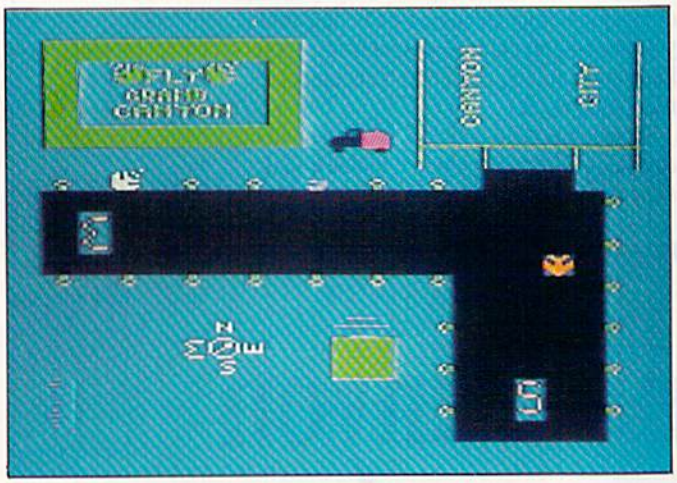
Initially, a number of housekeeping details are taken care of, including establishing the strings (lines 100–140) that are used to create the random Print statements determining the direction the canyon will turn. Note that, unlike other similar graphics programs that use Print statements of this type, the four E$ Print strings are created using matching custom characters at the edges of the canyon.

The E$ strings are chosen using the E(I,J) array, which allows the program to give the canyon smooth sides as it changes to right, left or straight sections. Line 150 uses two random statements—Y, to locate the initial opening in the canyon, and X, to position the plane. The Poke statement in line 160 locates the cursor one row up from the bottom of the screen. This is the position of the first canyon Print statement.

Lines 170–270 are the heart of the game. These form the loop that controls the plane, prints the canyon and detects collisions. A number of steps have been taken in these lines to speed up the Basic program. For example, a For. . .Next loop has been used in lines 170 and 270; this is faster than using GOTO 170 in line 270.

The command RND(0) has been used instead of the normal RND(1), and periods (.) have been used to replace the zeroes (0) in lines 170, 180, 190, 210, 240, 250 and 260; again, all this makes Basic run faster. (Many of these speed-up ideas came from the excellent article, "Basic Speedup," by John Tanzini, in the March 1984 issue of *RUN*.)

The If statements in lines 170 and 180 randomly choose whether the canyon turns right, left or goes straight. Lines 190 and 200 are If statements that keep the canyon on the screen. In line 210,



Listing 1. *First part of the Fly Grand Canyon program.*

```
10 REM FLY GRAND CANYON CUSTOM CHARACTERS;
   BY T. SIMMONDS
20 PRINT"{SHFT CLR}{2 CRSR DNs}{3 SPACEs}{C
   TRL 9}FLY GRAND CANYON{CTRL Ø}"
30 PRINT"{CRSR DN}{5 SPACEs}INSTRUCTIONS":P
   RINT"{CRSR DN} CHOOSE {CTRL 9}S{CTRL Ø}H
   ORT OR {CTRL 9}L{CTRL Ø}ONG":PRINT"{CRSR
    DN}{6 SPACEs}GAME THEN"
40 PRINT"{CRSR DN} {CTRL 9}P{CTRL Ø}OSSIBLE
   /{CTRL 9}I{CTRL Ø}MPOSSIBLE"
50 PRINT"{CRSR DN} USE JOY STICK TO FLY"
60 PRINT" AROUND AIRPORT THEN":PRINT" SOUTH
    WHEN READY TO"
70 PRINT"{CRSR DN}{3 SPACEs}{CTRL 9}{CTRL 6
   }FLY GRAND CANYON{CTRL Ø}"
80 PRINT"{CRSR DN}{2 SPACEs}PRESS ANY KEY T
   O":PRINT"LOAD CUSTOM CHARACTERS"
90 GETA$:IFA$=""THEN90
100 PRINT"{SHFT CLR}{8 CRSR DNs}{2 SPACEs}L
    OADING CHAR. & PGM"
110 FORI=ØTO511:READCC:POKE7168+I,CC:NEXT
120 POKE56,28:POKE55,Ø:CLR
130 POKE198,1:POKE631,131:NEW:END
140 REM POKE198,1Ø:POKE631,76:POKE632,111:P
    OKE633,34:POKE634,7Ø:POKE635,48
150 REM POKE636,34:POKE637,44:POKE638,56:PO
    KE639,58:POKE64Ø,131:NEW:END
160 DATA1,84,21Ø,216,254,24Ø,254,124
170 DATA1Ø2,6Ø,153,219,255,126,6Ø,24
180 DATA128,42,75,27,127,15,127,62
190 DATA128,192,224,224,224,192,192,128
200 DATA1,3,7,7,15,7,3,1
210 DATA255,255,254,252,224,192,128,128
220 DATA128,192,224,224,24Ø,254,255,255
230 DATA255,255,127,63,7,3,1,1
240 DATA1,1,7,31,31,63,255,255
250 DATA255,254,252,248,252,252,254,255
260 DATA255,127,127,255,127,63,127,255
270 DATA8,127,62,8,8,8,28,8
280 DATA24,6Ø,126,255,219,153,6Ø,1Ø2
290 DATA96,96,Ø,Ø,Ø,Ø,Ø,Ø
300 DATA28,57,115,254,254,115,57,28
310 DATA1,84,21Ø,216,254,24Ø,254,124
320 DATAØ,Ø,Ø,122,66,114,66,67
330 DATA56,156,2Ø6,127,127,2Ø6,156,56
340 DATA128,42,75,27,127,15,127,62
350 DATAØ,Ø,Ø,34,28,8,8,2ØØ
360 DATA49,74,67,74,5Ø,Ø,Ø,Ø
370 DATA146,9Ø,214,82,82,Ø,Ø,Ø
380 DATA139,116,36,36,35,Ø,Ø,Ø
```

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the plane is advanced down the screen and checked to determine whether it made it through the canyon. For a longer or shorter game, the variable W may be changed in lines 20 and 30.

In line 220, the first statement calculates Q$, the Print string; then the current color of the plane is Poked to the background color in preparation to moving it. The Q$ is printed at the bottom of the screen and all other canyon Print statements are pushed up, giving the illusion that the plane is moving down the canyon. Next, the position of the plane is updated and the color Poked to yellow to make it visible again. Finally, K is given the value of X. A collision with the wall or another plane is detected with the If. . .Then statement in the next line.

Line 240 Pokes in randomly colored planes. The frequency of their occurrence is controlled by the variable D, which was set by the possible/impossible option. You can make the game easier or more difficult by changing the value of the variable D in line 20.

The next two lines read the joystick, change X, the position of the plane, and set P, the custom character for a right, left or straight airplane. The last line of the loop is a Next statement and sends the program through the loop again.

Final Routines and Future Fun

Lines 280 and 290 produce the visual and sound effects of the crash. The screen is shaken by Poking the address that locates the center of the screen at the same time the screen colors are randomly changed. Following the explosion, the game score is updated and comments on the results printed to the screen. The player is then asked to hit the joystick's fire-button to play another game.

The program is not long and lends itself to modification. The canyon Print strings in lines 100–140 are composed mostly of randomly chosen graphics characters. As you play the game, watch what happens to these Print statements. Note that the individual characters change. This is the result of the graphics characters being taken from a part of memory that is the Basic program rather than the character ROM.

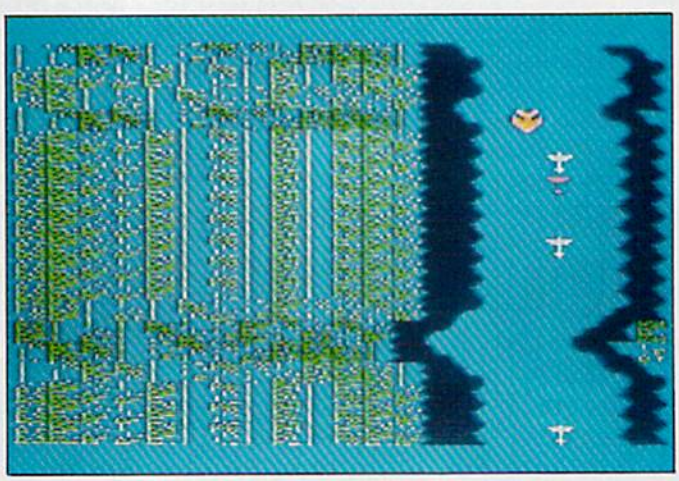
The canyon opening and the immediate characters on each side are critical, however. You might try changing the width of the canyon to make the game more difficult or easy. By modifying line 240, some other obstacle besides an airplane could be introduced to the canyon.

If the game is too hard, you may set the RND statement to some value other than >0.4. Go higher to >0.67, and more straight section of canyon will be chosen, making it easier to win. Experiment and have fun! R

Address all author correspondence to Thomas H. Simmonds, Jr., 127 Chestnut St., North Andover, MA 01845.

Listing 1 continued.

```
39Ø DATA36,18Ø,172,164,36,Ø,Ø,Ø
4ØØ DATAØ,Ø,4,1Ø,8,1Ø,6,Ø
41Ø DATAØ,Ø,196,17Ø,174,2Ø2,17Ø,Ø
42Ø DATA252,254,24Ø,254,216,21Ø,84,1
43Ø DATA1,1,1,1,1,1,1,1
44Ø DATA255,Ø,Ø,Ø,Ø,Ø,Ø,Ø
45Ø DATA62,127,15,127,27,75,42,128
46Ø DATAØ,Ø,36,52,44,36,Ø,Ø
47Ø DATAØ,14,16,12,2,28,Ø,Ø
48Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø
49Ø DATA255,255,255,255,255,255,255,255
5ØØ DATA224,64,1Ø4,111,124,47,41,7
51Ø DATA12,12,Ø,Ø,Ø,Ø,Ø,Ø
52Ø DATA31,32,64,255,64,32,16,15
53Ø DATA248,4,2,255,2,36,1Ø4,24Ø
54Ø DATA6Ø,66,141,141,145,161,66,6Ø
55Ø DATAØ,7,9,9,127,255,255,255
56Ø DATAØ,24,254,255,255,255,255,255
57Ø DATAØ,Ø,68,84,84,124,Ø,Ø
58Ø DATAØ,3Ø,32,16,8,16,32,3Ø
59Ø DATAØ,Ø,3Ø,32,64,64,32,16
6ØØ DATA16,32,64,64,32,3Ø,Ø,Ø
61Ø DATAØ,6Ø,66,64,64,64,6Ø,2
62Ø DATA2,2,2,66,6Ø,Ø,Ø,Ø
63Ø DATA114,162,114,2,151,146,96,Ø
64Ø DATA13Ø,114,13Ø,2,114,13Ø,242,2
65Ø DATA112,13Ø,242,2,98,146,98,2
66Ø DATA28,34,34,28,32,16,3Ø,16
67Ø DATA64,32,6Ø,32,64,Ø,64,124
68Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,255
69Ø DATA128,128,128,128,128,128,128,128
7ØØ DATA64,Ø,124,Ø,4Ø,68,68,56
71Ø DATAØ,Ø,Ø,62,8,16,62,Ø
72Ø DATAØ,Ø,15Ø,213,181,149,15Ø,Ø
73Ø DATA36,Ø,18,36,Ø,72,36,Ø
74Ø DATAØ,Ø,Ø,Ø,24,36,24,24
75Ø DATA4Ø,4Ø,3Ø,Ø,2Ø,34,34,28
76Ø DATA32,Ø,62,8,16,62,Ø,3Ø
77Ø DATAØ,Ø,32,2Ø8,2Ø8,32,Ø,Ø
78Ø DATAØ,Ø,4,11,11,4,Ø,Ø
79Ø DATA24,24,36,24,Ø,Ø,Ø,Ø
```



Listing 2. *The main Fly Grand Canyon program.*

```
1Ø REM FLY GRAND CANYON(MAIN PGM);BY T. SIM
   MONDS,N. ANDOVER, MA, Ø1845;
2Ø D=3Ø:W=12:CU=36869:SYS65Ø17
3Ø PRINT"{SHFT CLR}{3 CRSR DNs}{3 SPACEs}{C
   TRL 9}S{CTRL Ø}HORT OR {CTRL 9}L{CTRL Ø}
```

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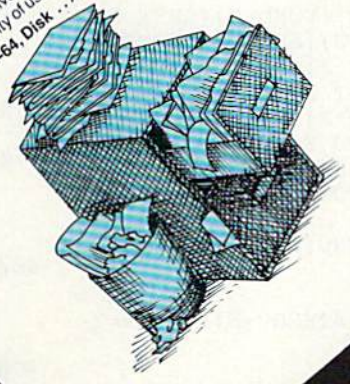

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Listing 2 continued.

```
   ONG";:INPUTL$:IFL$="L"THENW=22
4Ø PRINT"{CRSR DN}{CTRL 9}P{CTRL Ø}OSSIBLE
   OR {CTRL 9}I{CTRL Ø}MPOSSIBLE":INPUTP$:I
   FP$="I"THEND=1Ø
5Ø S1=36877:POKECU,255:POKES1+2,11Ø:L=3Ø72Ø
   :P=1:N=Ø:S=768Ø
6Ø GOSUB39Ø
7Ø S=768Ø:T=77Ø2:C=384ØØ:R=37139:IFF=1THEN1
   5Ø
8Ø DIME$(4):DIME(4,2):FORI=ØTO4:FORJ=ØTO2:R
   EADE(I,J):NEXTJ:NEXTI
9Ø DATAØ,4,2,1,2,4,Ø,4,2,Ø,Ø,Ø,1,2,4
1ØØ E$(Ø)="{SHFT H}{COMD Q}{SHFT D}{COMD W}
    {SHFT S}{COMD R}{SHFT E}{COMD T}{SHFT Y
    }{COMD Y}{SHFT O}{COMD U}{SHFT *}{COMD
    O}{SHFT T}{COMD P}{SHFT E}{CTRL 1}JI{4
    SPACEs}DI{CTRL 4}{SHFT B}{COMD Z}{SHFT
    X}{COMD X}{SHFT Z}{COMD C}{SHFT P}{COMD
     B}{SHFT U}{COMD N}{SHFT F}{COMD M}{SHF
    T L}{COMD L}{SHFT W}{COMD K}{SHFT D}{CO
    MD H}"
11Ø E$(1)="{COMD Z}{SHFT S}{COMD X}{SHFT F}
    {COMD C}{SHFT J}{COMD V}{SHFT L}{COMD B
    }{SHFT U}{COMD N}{SHFT I}{COMD M}{SHFT
    R}{COMD A}{SHFT E}{COMD D}{CTRL 1}JC{4
    SPACEs}JI{CTRL 6}{SHFT V}{COMD F}{SHFT
    M}{COMD G}{SHFT B}{COMD H}{SHFT C}{COMD
     K}{SHFT F}{COMD L}{SHFT A}{COMD Q}{SHF
    T Q}{COMD W}{SHFT G}{COMD E}{SHFT D}{CO
    MD R}"
12Ø E$(2)="{COMD G}{SHFT +}{COMD H}{SHFT LB
    .}{COMD J}{SHFT -}{COMD K}{SHFT L}{COMD
     L}{SHFT J}{COMD A}{SHFT G}{COMD S}{SHF
    T F}{COMD D}{SHFT S}{COMD F}{CTRL 1}JF{
    4 SPACEs}GF{CTRL 4}{SHFT B}{COMD L}{SHF
    T C}{COMD R}{SHFT X}{COMD E}{SHFT S}{CO
    MD E}{SHFT G}{COMD Q}{SHFT H}{COMD *}{S
    HFT T}{COMD @}{SHFT E}{COMD U}{SHFT W}{
    COMD N}"
13Ø E$(3)=""
14Ø E$(4)="{COMD P}{SHFT M}{COMD O}{SHFT N}
    {COMD I}{SHFT V}{COMD U}{SHFT X}{COMD Y
    }{SHFT L}{COMD T}{SHFT J}{COMD R}{SHFT
    G}{COMD E}{SHFT D}{SHFT E}{CTRL 1}JE{4
    SPACEs}HI{CTRL 6}{COMD R}{COMD G}{SHFT
    C}{COMD R}{SHFT N}{COMD E}{SHFT V}{COMD
     H}{SHFT X}{COMD D}{SHFT Q}{COMD N}{SHF
    T +}{COMD C}{SHFT -}{COMD W}{SHFT LB.}{
    COMD Y}"
15Ø Y=INT(RND(Ø)*12+6):X=RND(Ø)*2Ø+46:V=Ø:Q
   =Ø:M=6:U=8164
16Ø POKE214,22:PRINT
17Ø FORI=1TO5ØØ:IFRND(.)>.4THENV=E(V,2):Y=Y
   +V-3:GOTO19Ø
18Ø V=E(V,INT(RND(.)*2))
19Ø IFY<5THENY=5:V=.
2ØØ IFY>18THENY=18:V=1
21Ø Q=Q+1:IFQ>WTHENQ=.:X=X+22:IFX>467THEN32
   Ø
22Ø Q$=MID$(E$(V),Y,23):POKEC+K,6:PRINTQ$:P
   OKES+X,P+1:POKEC+X,7:K=X
23Ø N=N+1:IFPEEK(T+X)<>32THEN28Ø
24Ø IFRND(.)*D<1THENPOKEU-Y,11:POKEU+L-Y,RN
   D(.)*6
25Ø P=.:POKER,.:POKEH,.:IF((PEEK(Z)AND128)=
   .)THENX=X+1:P=P+1
26Ø POKEH,255:IF((PEEK(PA)AND16)=.)THENX=X-
   1:P=P-1
27Ø NEXT
28Ø FORI=15TOØSTEP-.3:POKES1,RND(Ø)*1ØØ+1ØØ
   :POKES1+19,RND(Ø)*8+2:POKES1+1,I
29Ø POKES1+2,RND(Ø)*255:NEXT:POKES1,Ø:POKES
   1+2,11Ø:POKES1+19,5
3ØØ IFF1=1THENF1=Ø:RETURN
31Ø POKECU,242:PRINT"{SHFT CLR}{4 CRSR DNs}
   {4 SPACEs}YOU CRASHED AND":PRINT"{CRSR
   DN}{7 SPACEs}{CTRL 9}{CTRL 6}EXPLODED{C
   TRL Ø}{CTRL 4}":GOTO33Ø
32Ø POKECU,242:POKES1+1,Ø:PRINT"{SHFT CLR}{
   4 CRSR DNs}{2 SPACEs}CONGRATULATIONS!!"
   :PRINT"{4 SPACEs}YOU MADE IT"
33Ø SS=1Ø:IFD=1ØTHENSS=15
34Ø IFN>N1THENPRINT"{CRSR DN} NEW {CTRL 9}{
   CTRL 5}HIGH SCORE";N*SS:N1=N:GOTO36Ø
35Ø PRINT"{CRSR DN}{4 SPACEs}YOUR SCORE {CT
   RL 9}{CTRL 6}";N*SS:PRINT"{CRSR DN}{4 S
   PACEs}{CTRL 9}{CTRL 8}HIGH SCORE{CTRL 9
   }{CTRL 1}"N1*SS
36Ø PRINT"{2 CRSR DNs}{CTRL 4}PUSH {CTRL 9}
   FIRE{CTRL Ø} TO TRY AGAIN{CTRL 2}"
37Ø IF((PEEK(PA)AND32)<>Ø)THEN37Ø
38Ø F=1:GOTO5Ø
39Ø PRINT"{SHFT CLR} {CTRL 6}!!!!!!!!!{3 SPA
   CEs}{CTRL 6}[ {CTRL 4}7{CTRL 6}{5 SPACE
   s}5":PRINT" ! {CTRL 4}RPSO{CTRL 6} !{3
   SPACEs}[ {CTRL 4}2{CTRL 6}{3 SPACEs}{CT
   RL 4}3{CTRL 6} 5"
4ØØ PRINT" ! {CTRL 4}XY8{2 SPACEs}{CTRL 6}!
   {3 SPACEs}{CTRL 6}[ {CTRL 4}<{CTRL 6}{3
    SPACEs}{CTRL 4}6{CTRL 6} 5":PRINT" ! {
   CTRL 4}TUVW {CTRL 6}!{3 SPACEs}{CTRL 6}
   [ {CTRL 4};{CTRL 6}{5 SPACEs}5"
41Ø PRINT" !!!!!!!!{CTRL 1} '{CTRL 3}({CTRL
    6}[44444445":PRINT"{1Ø SPACEs}{CTRL 1}
   M#{CTRL 6}[{2 SPACEs}5{2 SPACEs}5 5"
42Ø PRINT"{CTRL 4} : {CTRL 2}O{CTRL 4} : :
   {CTRL 5}R{CTRL 4} : : {CTRL 1}!!!":PRIN
   T"{CTRL 1}[!!!!!!!!!!!!!!!!!!!{CTRL 4}="
43Ø PRINT"{CTRL 1}[!{CTRL 8}+{CTRL 1}!!!!!!
   !!!!!!!!!!":PRINT"{CTRL 1}[!{CTRL 8},{C
   TRL 1}!!!!!!!!!!!!!!!!{CTRL 4}="
44Ø PRINT"{CTRL 1}[!!!!!!!!!!!!!!!!!":PRIN
   T"{CTRL 4} ? ? ? ? ? ? ?{CTRL 1}!!!!!!{C
   TRL 4}="
45Ø PRINT"{14 SPACEs}{CTRL 1}!!!!!":PRINT"{
   6 SPACEs}{CTRL 2}{UP ARROW}{3 SPACEs}{C
   TRL 5}$% {CTRL 4}>{CTRL 1}!!!!!{CTRL 4}
   ="
46Ø PRINT"{5 SPACEs}{CTRL 2}*&){2 SPACEs}{C
   TRL 4}!! {CTRL 1} !!!!!"
47Ø PRINT"{6 SPACEs}{CTRL 2}{LEFT ARROW}{3
   SPACEs}{CTRL 4}!! {CTRL 4}>{CTRL 1}!!!!
   !{CTRL 4}=":PRINT" {CTRL 5}1{11 SPACEs}
   {CTRL 1} !!{CTRL 8}-{CTRL 1}!!"
48Ø PRINT" {CTRL 5}Ø{11 SPACEs}{CTRL 4}>{CT
   RL 1}!!{CTRL 8}.{CTRL 1}!!{CTRL 4}=":PR
   INT" {CTRL 5}/{11 SPACEs}{CTRL 1} !!!!!
   "
49Ø PA=37137:Z=37152:H=Z+2:A=S+149:POKES1+1
   ,5:POKES1,16Ø:A1=33:C1=Ø:A2=A:B=Ø
5ØØ A=A+B:POKEA2,A1:POKEA2+L,C1:A2=A:A1=PEE
   K(A):C1=PEEK(A+L)
51Ø IFPEEK(A)>35ANDPEEK(A)<41THENN=N-1Ø:F1=
   1:GOSUB28Ø:GOTO39Ø
52Ø POKEA,P:POKEA+L,7
53Ø P2=P:POKEH,127:G=(NOTPEEK(Z-1))AND6Ø-((
   PEEK(Z)AND128)=.):POKEH,255
54Ø B=-22*((GAND8)>.)+22*((GAND4)>.)-((GAND
   1)>.)+((GAND16)>.)
55Ø P=-1*((GAND8)>.)-17*((GAND1)>.)-14*((GA
   ND16)>.)-12*((GAND4)>.):IFB=.THENP=P2
56Ø IFA<768ØTHENA=768Ø+INT(RND(Ø)*4Ø)
57Ø IFA>81ØØTHENPRINT"{SHFT CLR}":RETURN
58Ø GOTO5ØØ
```

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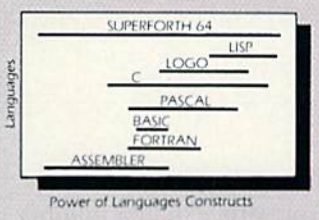

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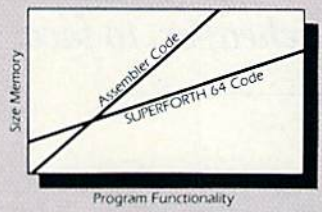

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Tax Records 64

By GARY FIELDS

Load Tax Records 64 into your C-64, and April 15, tax day, will be a lot easier, and perhaps cheaper, to face.

To assist me in using Tax Records 64, I keep one large envelope where I store every bill, check stub, receipt and so on until the first of the month.

I then enter everything into Tax Records 64 and I divide the income and deductions into two other envelopes, which I place in storage. The large envelope is then empty again, ready for another month's receipts.

I make a separate file of each month's records (June 84, for example). Then, at the end of the year, I merge all 12 files into one, named Tax File 84.

In Tax Records 64, there are two main menus: File Options and Work with File (name).

You cannot get past menu 1, File Options, until you create a file and store it in memory. Press N for New File, give the file a name and answer the prompts.

Respond to the Category prompt by pressing either I for income, D for deduction or ! to end the file. The program will allow you to enter only these three characters.

If you choose I, answer the Subcategory prompt by pressing either W for wages, F for farm, D for dividend, O for other, I for interest, R for rental or B for business.

If you choose D (deduction), answer the Subcategory prompt by pressing either I for interest, M for medical, E for education, B for business, T for tax, C for contribution, R for retirement fund or O for other.

The program has checks to prevent you from entering wages or farm as a deduction, or education, tax or medical as income.

Next, enter the source of the money (at the Source prompt). This must be a minimum of four letters, a maximum of ten letters. The program will not allow you to break this rule. Be mindful that the first four letters will be used later to search for a specified source. So, if you entered interest from three different banks as Bank 1, Bank 2 and Bank 3, it would be better to enter the banks as 1 Bank, 2 Bank and 3 Bank, so you could later search for them separately if need be.

When responding to the Date prompt, always enter the month, followed by the day, and always use five characters (for example, enter 01-02 for January 2).

You may enter anything in response to the Record/Receipt prompt. Your answer must be from one to six characters long (for example, CK#123, or STUB, or NONE).

The Amount prompt is last. Enter dollars and cents. Don't use commas. Don't use a dollar symbol. The program will not allow the first character to be anything other than a number or decimal point. You must enter cents, even if it's only ".00".

Next, you will be asked if all the data is correct. If you select N, the cursor will return to the first item. Press the return key until the cursor rests on the incorrect item. Change the data and press the return key until you are asked if it is correct again. If it is, enter Y and press Return. When you are finished, enter ! as the category, and the file will be written to disk and closed.

Press the return key, and you'll be returned to menu 1, File Options.

Menu 1's Options

-LOAD EXISTING FILE-

After a file has been created, you call it into memory by selecting L from the File Options menu. You will be prompted with "Recall File." Enter the name of the existing file (? and * wild cards are legal). The file will be printed on the screen as it is recalled, and a total record count will be displayed.

Remember, this program is dimensioned to handle 501 records. Do not exceed this unless you first increase the DIM statement in line 340. My total count for 1983 was 226 records, so 500 records should be adequate for the average taxpayer.

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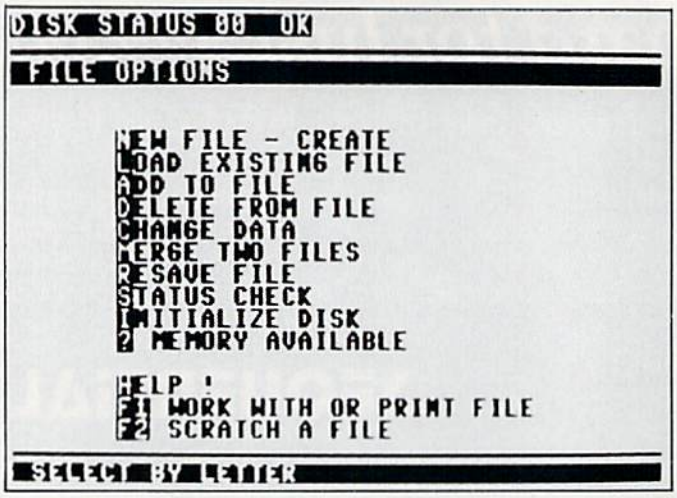
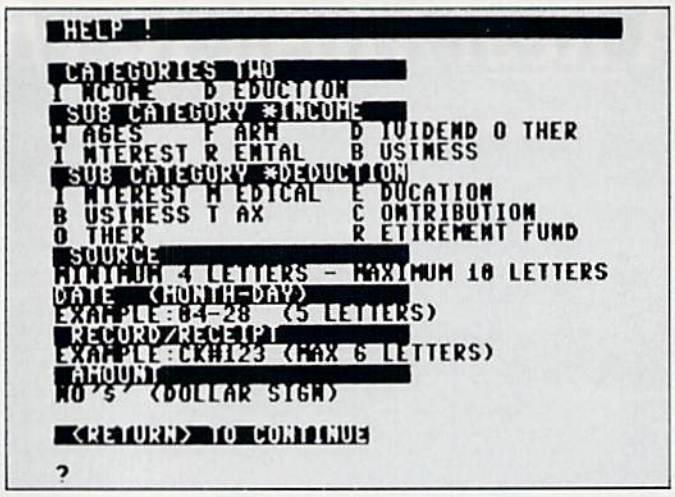




After a file is in memory, you can advance to the second menu by selecting f1.

·ADD TO FILE·

To add to an existing file, select A. Prompts are the same as "New File," except that you exit by selecting N when you are asked if you want to "Add More (Y/N)?".

Adding to a file is a little slower than creating a new file, and the file is not printed to disk and closed until you either select R, Rename and Save File, or f1. You are then asked to name the new file; make sure the name you give it doesn't already exist on the disk. Tax Records 64 automatically writes over and updates files using the original filename, so be careful not to overwrite a file unless that's what you mean to do. (See lines 650 and 7020 in the program listing: OPEN1,8,2,"@0:"+N$+",S,W". This enables you to save a file using the old name.)

·DELETE FROM FILE·

Select D to delete from the file in memory. You will then be asked if the file is an "I," income, or a "D," deduction.

Next, you'll be asked for at least the first four letters of the file's source. Press the return key and the program will display the first file matching these two descriptions. You'll be asked if this is correct. If it isn't, enter N. The displayed line will be erased and replaced with the next match. This continues until all matches are checked.

When the correct record is displayed, enter Y, and the record will be deleted from the file.

Note: This option works best on small files. As the file gets larger, more and more time is required to shift all the data after each delete. (After I made several deletes to a large file, the cursor seemed to be gone forever.)

A quicker way to delete several records from a sizable file is to change the record (see "Change Data" below). Simply replace the source with the word "delete" (or a similar word) and enter ".00" for the amount. A little messy, yes, but much faster if you are working with a large file.

If the record to delete is not found in the file, the program will print RECORD NOT FOUND and return to the first menu.

·CHANGE DATA·

Select C to change some part of an existing file. The prompts and displays are similar to Delete and Add. After making any changes, always resave the file. Before you can get to the Work with File menu, where the Quit option is located, your file must be saved.

There is one exception. If you change the file and then select Delete without deleting anything, the program will activate a flag, signaling no change was made, and you could mistakenly advance to Work with File without first having saved the changed file. Always resave your file before turning off your computer. (That is why the Rename and Save File option is included.)

·MERGE TWO FILES·

The program offers the option to merge two files as well as scratch an unwanted file. To merge two files, simply select M and follow the prompts. For instance, you could merge your January and February tax records with this option. Be careful not to merge a file twice, thus duplicating data. You can avoid the Merge option by loading an existing file and adding information to it. However, I find it easier and faster to create monthly files and then merge.

·STATUS CHECK·

Select S to check the status of the disk drive. The disk is automatically checked several times within the program.

·INITIALIZE DISK·

Each time you change a disk, select I to initialize that disk. This is another safety feature. Should you switch disks without initializing, and both the old and new disks contain the same ID code, the disk drive would not realize you had switched disks and could overwrite valuable files or programs.

·MEMORY AVAILABLE·

Select "?" to display how much memory remains unused in the 64. A check may take a minute or more after a sizable file is in memory.

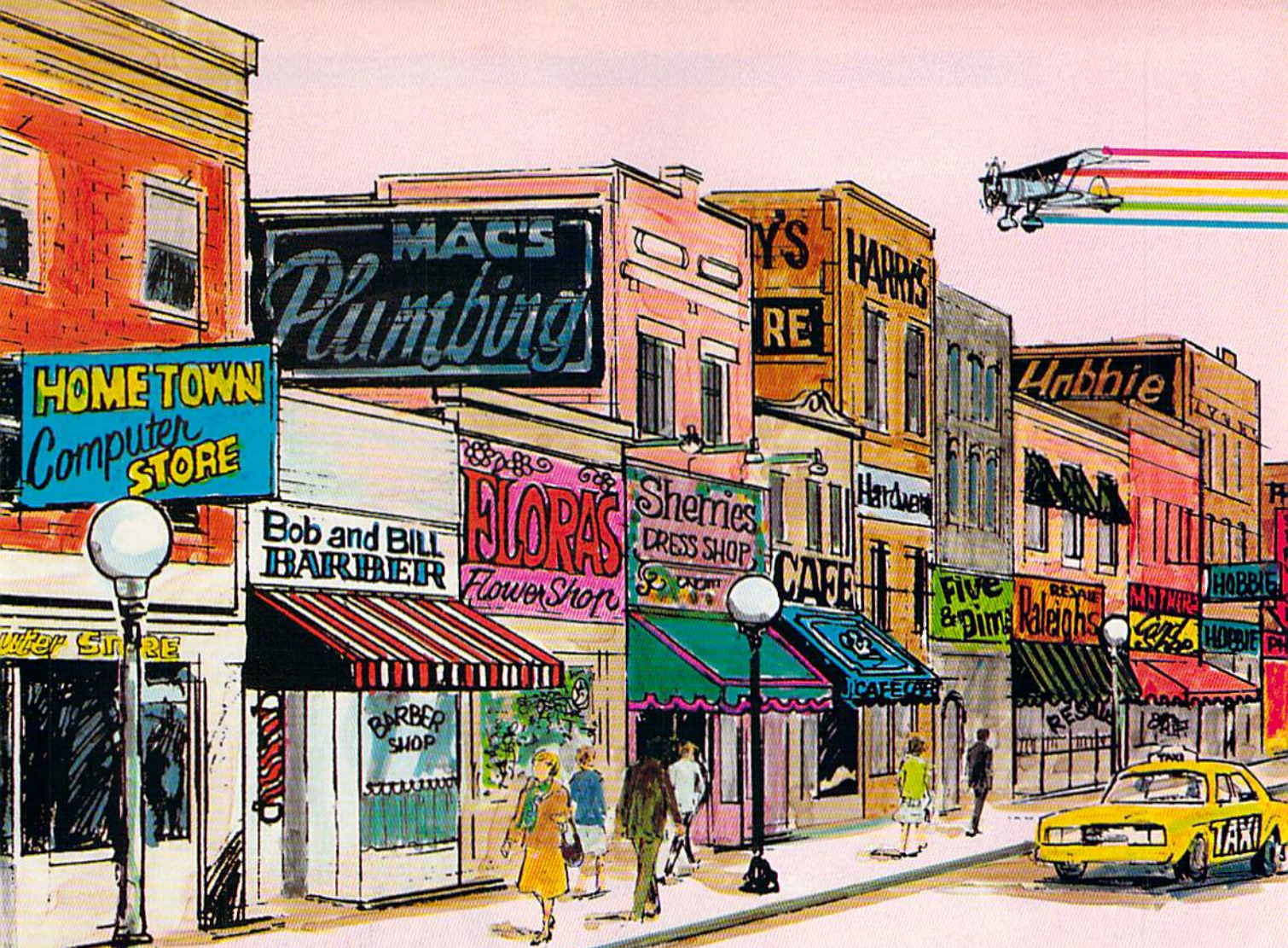
·HELP !·

If you can't remember what categories or subcategories are allowable, press H for a display of that information.

Let me mention something else here, too. When I first started the program, I intended to disable the run/stop key so you would not accidentally break out (see line 2).

After using this program, however, I found that if you load the C-64 wedge from the demo disk that came with your disk drive before loading Tax Records 64, you can display the disk directory without disturbing the program. This is handy when calling up a file or merging files.

You can break into the program by pressing the run/stop key while at either menu. Print "@$" in Direct mode. This will display the directory. After you have seen all you need, type



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CONT and press the return key. Now press H twice, and you will return to the menu.

Be careful not to cause a syntax error while in Direct mode.

·WORK WITH AND PRINT FILE·

Select f1 to advance to menu 2, which allows you to examine, manipulate data, print out information contained in the file in memory and quit the program. If you have made changes to the file in memory, remember that Tax Records 64 requires you first to resave the file before you can advance to this menu.

·F2 SCRATCH A FILE·

Select f2 to scratch a file. Be careful with this one. You don't want to erase an important file. To avoid trouble, this option will double-check before it will scratch a file. (Another good reason to use the wedge is to see your disk's directory at a crucial point like this.)

Menu 2's Options

To access menu 2, remember to press f1.

·TOTAL REVIEW·

Select T for a total review of the file. You will be asked if you want a printout. If you don't, you need only press the return key, as this option always defaults to No. The file's records are all displayed on the screen by subcategory.

·SEARCH FOR (BY #)·

You can search for information by Category, Subcategory, Source, Month, Record or Amount.

If you choose one of these options, you will be asked if you want a printout. If you don't, just press the return key. You will then be asked if the search is for an I, income, or a D, deduction. Next, you will be asked to enter information to enable a specific search. For example: Search for all income in the month of 04 (April) or all the deductions under C (contributions).

The screen will display 13 lines of information, then display a Return for More prompt. Along with the information in the file, the program keeps a running total of incomes and deductions, and the total is displayed after the search ends.

The remainder of the Work with File menu contains the same options as the first menu, except Q. This option closes all files and ends the program in an orderly fashion. Remember: If you've made changes in the file, don't quit without first saving the file.

Making It Work for You

Once you get the program's listing typed in, you'll have a very helpful tax utility program that should aid you as long as there are taxes—and that will probably be forever.

Of course, you can also use Tax Records 64 at times other than April 15. For instance, you might want to resubmit someone's medical bills for insurance coverage, or to locate important financial information stored in your tax record file such as interest payments, child care credits and so on.

I've used Tax Records 64 for two years and have given it out to several friends to test and use. Thus, it is a proven product. I think you'll like it, too.

This program occupies a little over 9K of memory before it is run. After it's run, the DIM statements expand this to about twice that, leaving around 20K for your file. An average file takes up 30 bytes, which, with a

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B$—choose income or deduction display
N$—filename
T1—total income
T2—total deduction
P$—keeps track of whether a printout was requested
LC—allows only 13 records on the screen
WF—checks to see if file was changed in some way
0 = file not changed
1 = file was changed
GZ—A flag (see lines 7084, 7210 and 7220) enables using the same portion of the program for both New A File and Change or Add
ZA—0 = no file in memory
1 = file is in memory
H—0 = HELP! request came from screen 1
1 = HELP! request came from screen 2
E—0 = file searched for was found
1 = file searched for was not found

Table 1. *Explanations of some of the variables used in Tax Records 64.*

500-record file, still leaves 5K unused. Therefore, if you need a file of 600–650 records, you could safely increase the DIM statement in line 340.

One more note: If you accidentally move the cursor while you're typing, reposition it using the cursor keys, type your information and press the return key twice. The second return will accept your input. If you input an incorrect answer, continue the record until the program asks "CORRECT (Y/N)"; then answer N and press the return key until it returns you to the incorrect line of entry. Retype it and press the return key until you're asked CORRECT (Y/N) again. Answer Y.

Accompanying this article is an explanation of Tax Records 64's program lines. Tape users should be able to change lines 650 and 7020 to reflect the correct syntax for tape use. (Also, delete the OPEN 15 statement in line 6 and CLOSE 15 in line 1504.)

I'll be happy to make a copy of Tax Records 64 for anyone who sends me a formatted disk along with a self-addressed stamped return mailer and $3 to cover the copying costs. R

Address all author correspondence to Gary V. Fields, 86 Lanvale Ave., Asheville, NC 28806.

FILE: TAX MERGE

SEARCH:1 1 = CATEGORY 2 = SUBCAT 3 = SOURCE 4 = MONTH 5 = RECORD 6 = AMOUNT

C	SUB	SOURCE	DATE	RECORD	AMOUNT
I	. .	W . . SOUTH PAC	04-04	33	$ 1.24
I	. .	F . . CALF SALE	01-28	2	$ 154.44
I	. .	D . . UT STOCK	04-04	3	$ 32.19
I	. .	I . . 1ST UNION	04-12	4	$ 10.27
I	. .	R . . 32 PACK ST	04-01	5	$ 600.00
I	. .	B . . MAG SALE	04-02	6	$ 100.00
I	. .	O . . TX REFUND	04-15	7	

TOTAL INCOME $ 900.34
TOTAL DEDUCTIONS $ 0

Table 2. *Example of Tax Records 64's printer output according to specified Search (category) for income.*

FILE: TAX MERGE

SEARCH:1 1 = CATEGORY 2 = SUBCAT 3 = SOURCE 4 = MONTH 5 = RECORD 6 = AMOUNT

C	SUB	SOURCE	DATE	RECORD	AMOUNT
D	. .	I . . UT STOCK	01-01	1	$ 10.00
D	. .	M . . SMITH MD	02-01	2	$ 20.00
D	. .	E . . ETSU BOOKS	03-01	3	$ 45.89
D	. .	T . . COUNTY	01-04	4	$ 675.19
D	. .	C . . BAPT CH	01-18	5	$ 10.00
D	. .	R . . IRA KATHY	04-14	6	$ 500.00
D	. .	B . . COMPUTER	01-02	7	$ 249.27
D	. .	O . . DAY CARE	01-02	8	$ 35.00
D	. .	T . . PHONE TAX	01-04	9	$ .94

TOTAL INCOME $ 0
TOTAL DEDUCTIONS $ 1546.29

Table 3. *Example of Tax Records 64's printer output according to Search (category) for deductions.*

FILE: TAX MERGE

SEARCH:3 1 = CATEGORY 2 = SUBCAT 3 = SOURCE 4 = MONTH 5 = RECORD 6 = AMOUNT

C	SUB	SOURCE	DATE	RECORD	AMOUNT
D	. .	I . . UT STOCK	01-01	1	$ 10.00

TOTAL INCOME $ 0
TOTAL DEDUCTIONS $ 10

Table 4. *Example of Tax Records 64's printer output according to Search (source) for deductions.*

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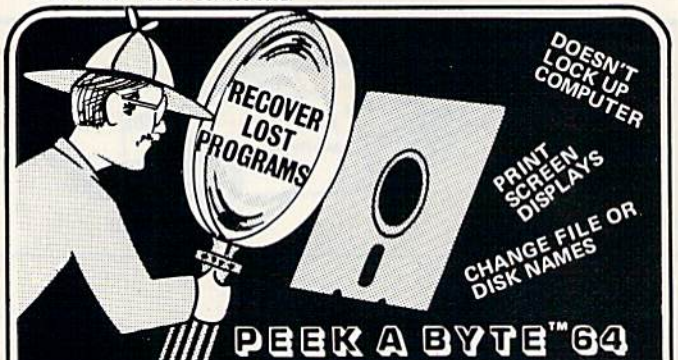

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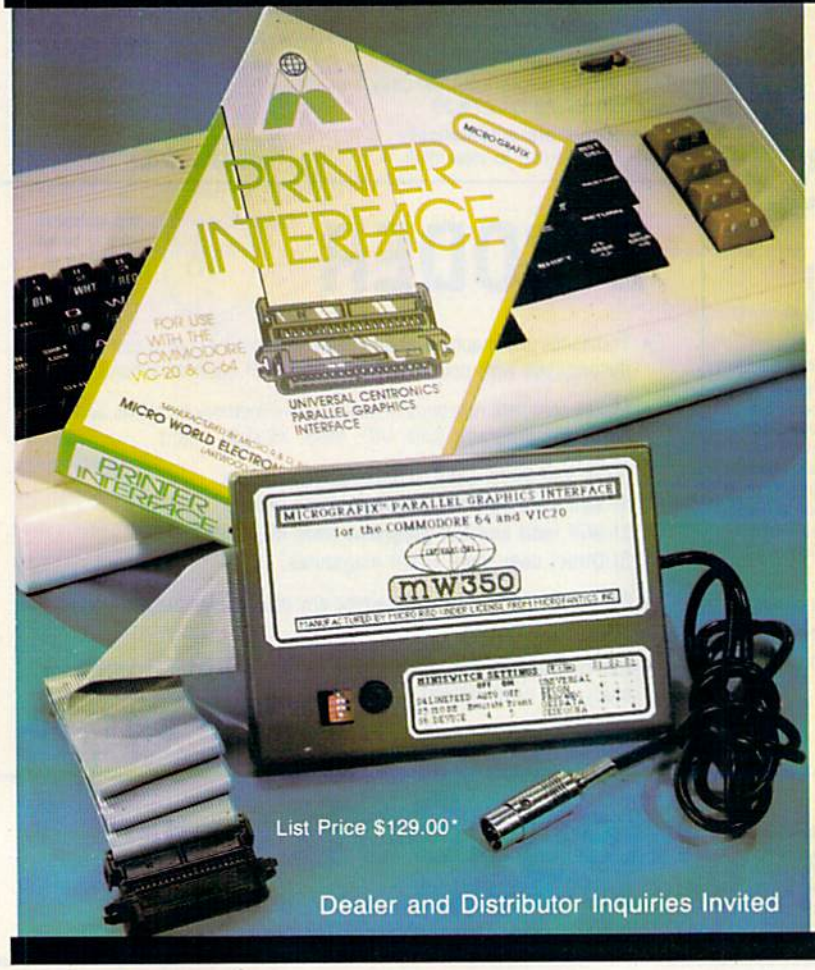

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2—Removes REM to disable the run/stop key.
6—Opens command channel and sets up cursor variables.
10—Pokes screen white, makes type black and clears screen.
12—Sets up sound variables.
15—Jumps lines 16–200, which are subroutines.
Lines 16–200 are subroutines.
16—Erases one line of type.
20—Calls up three often-used routines.
21—A pause (delays the program).
22—Used to request a user response to the program.
24—Initializes the disk.
25—Clears the screen.
26—Checks the disk status.
27—Draws a line across the screen, then sounds a tone.
30—Checks memory available and displays.
35–45—Print records on the screen. If requested, 38–43 print to the printer. The LEN function is used to position the data in uniform columns.
46–49—Print out totals.
50–60—Loop to target a search in Delete or Change.
70–75—Request for print out and prints header.
76–79—Check for a correct search match when working with a file.
80–89—Request for an "I" or a "D" search.
90–98—End a search and print totals.
100–108—This routine types messages with sound.
200—Double-checks response.
300–310—The title screen at the beginning of main program.
340—DIMensions arrays (it was put here so the delay would not delay the program).
500–550—File Options screen.
570–590—Look for a proper response to File Options.
600—Checks to see if the file was changed.
610–680—Rename and save the changed file.
700—Checks status, etc., and sets flags.
710–744—Work with File (name) screen.
810–850—Check for a proper response to the second screen.
900–948—Display the total file in memory according to Subcategories.
950–960—Category search.
1000–1006—Subcategory search.
1100–1104—Source search.
1200–1206—Month search.
1300–1306—Record/Receipt search.
1400–1404—Amount search.
1500–1504—Exit and close all files. Restore run/stop key.
1700–1708—Scratch a file.
2000–2210—HELP ! routine. Lines 2200 and 2210 check to see which screen to return to.
5500–5536—Recall an existing file into memory.
7000–7252—Create a new file. Same routine is used to Change and Add to a file. "GZ" checks to see if the user is creating or changing a file.
7400–7418—Delete a record.
7600–7635—Change a record.
7800–7910—Merge two files.

Table 5. *A line-by-line explanation of Tax Records 64.*

Listing 1. *Tax Records 64 program.*

```
1 REM{2 SPACEs}TAX RECORDS 64
2 REM POKE788,52:REM DISABLE STOP/RUN **
6 OPEN15,8,15:U$=CHR$(145):RT$=CHR$(18):RO$
  =CHR$(146):VP=1
1Ø POKE53281,1:POKE5328Ø,1:PRINTCHR$(144)CH
   R$(147)
12 SL=54272:SH=54273:PL=54274:PH=54275:SW=5
   4276:SA=54277:SS=54278:SV=54296
15 GOTO3ØØ
16 FORX=1TO39:PRINTCHR$(32);:NEXTX:PRINTU$:
   RETURN
2Ø GOSUB25:GOSUB26:GOSUB27:RETURN
21 FORX=1TO5ØØ:NEXTX:RETURN
22 PRINTRT$" <RETURN> TO CONTINUE":IP$="":G
   OSUB1ØØ:PRINT:INPUTA$:RETURN
24 PRINTRT$"INITIALIZING DISK":PRINT#15,"IØ
   ":RETURN
25 PRINTCHR$(147):PRINT:PRINT:RETURN
26 INPUT#15,X6$,X7$:PRINTRT$"DISK STATUS ";
   X6$;"{2 SPACEs}";X7$:RETURN
```

Listing 1 continued.

```
27 FORX=ØTO39:PRINTCHR$(1Ø2);:NEXTX:IP$="":
   GOSUB1ØØ:PRINTU$;:RETURN
3Ø PRINTRT$"MEMORY AVAILABLE:";FRE(Ø)-(FRE(
   Ø)<Ø)*65536:RETURN
35 V3=LEN(AM$(C)):H3=12-V3:V5=37-V3:IFH3<1T
   HENH3=1
36 PRINTCA$(C);" ";SC$(C);" ";SO$(C);TAB(14
   )DA$(C);:PRINTTAB(22)RE$(C);
37 PRINTTAB(29)"$";TAB(V5)AM$(C):AM=VAL(AM$
   (C)):LC=LC+1:IFZA=1THENLC=Ø
38 IFCA$(C)="I"THENT1=AM+T1
39 IFCA$(C)="D"THENT2=AM+T2
4Ø IFP$="Y"THENV1=LEN(SO$(C)):V2=LEN(RE$(C)
   ):H1=12-V1:H2=12-V2
41 IFP$="Y"THENPRINT#2,CA$(C);"..";SC$(C);"
   ..";SO$(C);SPC(H1)DA$(C);
42 IFP$="Y"THENPRINT#2,"";SPC(4)RE$(C);SPC(
   H2);"$";SPC(H3)AM$(C)
43 IFLC>12THENLC=Ø:GOSUB22
45 RETURN
46 IFP$="Y"THENPRINT#2:PRINT#2,"TOTAL INCOM
   E $";T1
47 IFP$="Y"THENPRINT#2,"TOTAL DEDUCTIONS $"
   ;T2
49 RETURN
5Ø PRINT"CATEGORY (I) OR (D)":IP$="":GOSUB1
   ØØ
51 INPUTCA$:IFCA$="I"THEN53
52 IFCA$<>"D"THENPRINTU$;:GOTO51
53 PRINT"SOURCE{2 SPACEs}(MINIMUM 4 LETTERS
   )":INPUTSO$
54 E=Ø:FORC=1TON
55 IFCA$<>CA$(C)ORLEFT$(SO$,4)<>LEFT$(SO$(C
   ),4)THEN6Ø
56 GOSUB35
57 PRINTRT$" CORRECT DATA (Y/N) ":IP$="":GO
   SUB1ØØ:INPUTX$
58 IFX$="Y"THEN62
59 PRINTU$U$U$U$:GOSUB16
6Ø NEXTC
61 IP$="RECORD NOT FOUND":GOSUB1ØØ:PRINT:E=
   1:GOSUB21
62 RETURN
7Ø CLOSE2:INPUT"WILL YOU NEED A PRINT OUT (
   Y/N)";P$:IFP$="Y"THENOPEN2,4
71 IFP$="Y"THENPRINT#2,"FILE: ";N$:PRINT#2:
   PRINT#2,"SEARCH:";A$;" 1=CATEGORY ";
72 IFP$="Y"THENPRINT#2,"2=SUB CAT 3=SOURCE
   4=MONTH 5=RECORD 6=AMOUNT":PRINT#2
73 IFP$="Y"THENPRINT#2,"C SUB SOURCE......D
   ATE.....";
74 IFP$="Y"THENPRINT#2,"RECORD..........AM
   OUNT":PRINT#2
75 RETURN
76 J=Ø:IFB$="I"ANDCA$(C)=B$THENJ=1:RETURN
77 IFB$="D"ANDCA$(C)=B$THENJ=1:RETURN
78 IFB$="B"THENJ=1:RETURN
79 RETURN
8Ø GOSUB27:PRINTRT$"I"RO$"NCOME":PRINT"OR":
   PRINTRT$"D"RO$"EDUCTION"
82 PRINT
84 INPUTB$
86 IFB$="I"THENRETURN
87 IFB$="D"THENRETURN
89 IFB$<>"D"THENPRINTU$;:GOTO84
9Ø PRINT"FINISHED":IP$="":GOSUB1ØØ:PRINT
91 GOSUB46
92 PRINTRT$"TOTAL INCOME{5 SPACEs}$"T1:PRIN
   TRT$"TOTAL DEDUCTIONS $"T2
96 IFVP>ØTHEN CLOSE2
98 GOSUB22:RETURN
1ØØ FORXC=ØTOLEN(IP$)
1Ø2 POKESV,8:POKESH,5Ø:POKESL,6Ø:POKESA,12Ø
   :POKESS,3Ø:POKESW,17
1Ø4 PRINTLEFT$(IP$,XC+1)U$:FORX=1TO78:NEXTX
   :POKESV,Ø:POKESW,16:NEXTXC
1Ø8 FORX=54272TO54296:POKEX,Ø:NEXTX:FORX=1T
   O1ØØ:NEXTX:RETURN
2ØØ PRINT:IP$="ARE YOU SURE (Y/N)":GOSUB1ØØ
   :PRINT:RETURN
3ØØ GOSUB25:GOSUB27:PRINT:IP$="TAX RECORDS
   64":GOSUB1ØØ:PRINT:GOSUB27
31Ø PRINT"BY G.FIELDS":PRINT:PRINT:PRINT"*
   1984 *"
34Ø DIMCA$(5ØØ),SC$(5ØØ),SO$(5ØØ),DA$(5ØØ),
   RE$(5ØØ),AM$(5ØØ):GOSUB21
5ØØ GOSUB2Ø:LC=Ø
51Ø PRINTRT$" FILE OPTIONS{27 SPACEs}":PRIN
   T
53Ø PRINTTAB(6)RT$"N"RO$"EW FILE - CREATE"
531 PRINTTAB(6)RT$"L"RO$"OAD EXISTING FILE"
532 PRINTTAB(6)RT$"A"RO$"DD TO FILE"
534 PRINTTAB(6)RT$"D"RO$"ELETE FROM FILE"
536 PRINTTAB(6)RT$"C"RO$"HANGE DATA"
538 PRINTTAB(6)RT$"M"RO$"ERGE TWO FILES"
539 PRINTTAB(6)RT$"R"RO$"ESAVE FILE"
54Ø PRINTTAB(6)RT$"S"RO$"TATUS CHECK"
541 PRINTTAB(6)RT$"I"RO$"NITIALIZE DISK"
542 PRINTTAB(6)RT$"?"RO$" MEMORY AVAILABLE"
   :PRINT
543 PRINTTAB(6)RT$"H"RO$"ELP !"
544 PRINTTAB(6)RT$"F1"RO$" WORK WITH OR PRI
   NT FILE"
545 PRINTTAB(6)RT$"F2"RO$" SCRATCH A FILE":
   GOSUB27
55Ø PRINTRT$" SELECT BY LETTER{23 SPACEs}"
57Ø GETA$:IFA$=""THEN57Ø
571 IFA$="S"THENGOSUB26
572 IFA$="?"THENGOSUB3Ø
573 IFA$="I"THENGOSUB24:GOSUB16
574 IFA$="N"THENZA=Ø:GZ=Ø:GOTO7ØØØ
575 IFA$=CHR$(137)THEN17ØØ
576 IFA$="L"THENZA=1:GZ=Ø:GOTO55ØØ
577 IFA$="H"THENH=1:GOTO2ØØØ
578 IFZA<>1THENIP$="NO FILE IN MEMORY":GOSU
   B1ØØ:GOSUB16:GOTO57Ø
58Ø IFA$="A"THEN72ØØ
582 IFA$="D"THEN74ØØ
584 IFA$="C"THEN76ØØ
585 IFA$="M"THEN78ØØ
586 IFA$="R"THEN61Ø
59Ø IFA$<>CHR$(133)THEN57Ø
6ØØ IFWF<>1THEN7ØØ
61Ø GOSUB2Ø:PRINTRT$"BEFORE CONTINUING:{21
   SPACEs}":PRINT
62Ø PRINT"SAVE THE FILE NOW IN MEMORY"
63Ø PRINT"USING A DATE AS A FILE NAME"
64Ø PRINT"IS GOOD PRACTICE."
645 PRINT"NAME FILE":IP$="":GOSUB1ØØ:PRINT
646 N$="":INPUTN$:IFLEN(N$)<1ORLEN(N$)>16TH
   ENPRINTU$;:GOTO646
65Ø OPEN1,8,2,"@Ø:"+N$+",S,W"
655 GOSUB26:IFX7$<>"OK"THENCLOSE1:GOTO645
66Ø FORC=1TON
665 PRINT#1,CA$(C):PRINT#1,SC$(C):PRINT#1,S
   O$(C):PRINT#1,DA$(C)
667 PRINT#1,RE$(C):PRINT#1,AM$(C):NEXTC
68Ø CLOSE1:GOSUB26:PRINT" FILE "N$" SAVED":
   PRINT:GOSUB22
7ØØ GOSUB2Ø:ZA=Ø:T1=Ø:T2=Ø:P$="N":LC=Ø:WF=Ø
71Ø PRINTRT$"WORK WITH FILE ";N$
72Ø PRINTTAB(6)RT$"T"RO$"OTAL REVIEW"
721 PRINTRT$"{4 SPACEs}SEARCH FOR (BY #){4
   SPACEs}"
722 PRINTTAB(6)RT$"1"RO$"CATEGORY"
724 PRINTTAB(6)RT$"2"RO$"SUBCATEGORY"
726 PRINTTAB(6)RT$"3"RO$"SOURCE"
728 PRINTTAB(6)RT$"4"RO$"MONTH"
73Ø PRINTTAB(6)RT$"5"RO$"RECORD"
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Listing 1 continued.

```
732 PRINTTAB(6)RT$"6"RO$"AMOUNT":PRINT
734 PRINTTAB(6)RT$"Q"RO$"UIT AND CLOSE ALL
    FILES"
736 PRINTTAB(6)RT$"H"RO$"ELP !"
738 PRINTTAB(6)RT$"S"RO$"TATUS OF DISK"
740 PRINTTAB(6)RT$"?"RO$"MEMORY AVAILABLE"
742 PRINTTAB(6)RT$"I"RO$"NITIALIZE DISK"
744 PRINTTAB(6)RT$"F1"RO$" RETURN TO FILE O
    PTIONS"
800 GOSUB27:PRINTRT$" SELECT BY LETTER{23 S
    PACEs}"
810 GETA$:IFA$=""THEN810
818 IFA$="T"THEN900
820 IFA$="1"THEN950
822 IFA$="2"THEN1000
824 IFA$="3"THEN1100
826 IFA$="4"THEN1200
828 IFA$="5"THEN1300
830 IFA$="6"THEN1400
832 IFA$="Q"THEN1500
834 IFA$="H"THENH=0:GOTO2000
836 IFA$="S"THENGOSUB26
838 IFA$="?"THENGOSUB30
840 IFA$="I"THENGOSUB24
842 IFA$=CHR$(133)THENZA=1:GOTO500
850 GOTO810
900 GOSUB20:VP=0
910 PRINTRT$" TOTAL REVIEW{27 SPACEs}":PRIN
    T:GOSUB70:GOTO916
912 PRINTGG$:T1=0:T2=0:LC=0:IFP$="Y"THENPRI
    NT#2:PRINT#2,GG$:PRINT#2
914 FORC=1TON:IFCA$(C)=GH$ANDSC$(C)=LEFT$(G
    G$,1)THENGOSUB35
915 NEXTC:GOSUB90:RETURN
916 GH$="I":GG$="WAGES":GOSUB912:GG$="FARM"
    :GOSUB912:GG$="DIVIDENDS":GOSUB912
918 GG$="INTEREST":GOSUB912:GG$="RENTAL":GO
    SUB912:GG$="BUSINESS":GOSUB912
920 GG$="OTHER":GOSUB912
926 GH$="D"
928 GG$="INTEREST":GOSUB912:GG$="MEDICAL":G
    OSUB912:GG$="EDUCATIONAL":GOSUB912
930 GG$="TAX":GOSUB912:GG$="CONTRIBUTION":G
    OSUB912
932 GG$="RETIREMENT FUND":GOSUB912:GG$="BUS
    INESS":GOSUB912:GG$="OTHER":GOSUB912
948 GOTO700
950 GOSUB20:PRINTRT$" CATEGORY SEARCH (I) O
    R (D){13 SPACEs}":GOSUB70
955 INPUT"CATEGORY";WC$:FORC=1TON:IFCA$(C)=
    WC$THENGOSUB35
960 NEXTC:GOSUB90:VP=1:GOTO700
1000 GOSUB20:PRINTRT$" SUB CATEGORY SEARCH{
     20 SPACEs}":GOSUB70:GOSUB80
1002 PRINTRT$"{3 SPACEs}INCOME={3 SPACEs}W
     F D I R B O":PRINTRT$"DEDUCTION= I M E
      T C R B O"
1004 INPUT"SUB CATEGORY";WC$:FORC=1TON:GOSU
     B76
1005 IFCA$(C)=B$ANDSC$(C)=WC$THENGOSUB35
1006 NEXTC:GOSUB90:GOTO700
1100 GOSUB20:PRINTRT$" SOURCE SEARCH (FIRST
      4 LETTERS){8 SPACEs}":GOSUB70:GOSUB80
1102 INPUT"SOURCE";WC$:FORC=1TON:GOSUB76
1103 IFCA$(C)=B$ANDLEFT$(SO$(C),4)=LEFT$(WC
     $,4)THENGOSUB35
1104 NEXTC:GOSUB90:GOTO700
1200 GOSUB20:PRINTRT$" MONTH SEARCH (2 LETT
     ERS){8 SPACEs}":GOSUB70:GOSUB80
1202 INPUT"MONTH";WC$:IFLEN(WC$)<>2THENPRIN
     TU$;:GOTO1202
1204 FORC=1TON:GOSUB76:IFCA$(C)=B$ANDLEFT$(
     DA$(C),2)=WC$THENGOSUB35
1206 NEXTC:GOSUB90:GOTO700
1300 GOSUB20:PRINTRT$" RECORD/RECEIPT SEARC
     H (MAX 6 LETTERS){2 SPACEs}":GOSUB70:G
     OSUB80
1302 INPUT"RECORD/RECEIPT";WC$:IFLEN(WC$)<1
     ORLEN(WC$)>6THENPRINTU$;:GOTO1302
1304 FORC=1TON:GOSUB76:IFCA$(C)=B$ANDRE$(C)
     =WC$THENGOSUB35
1306 NEXTC:GOSUB90:GOTO700
1400 GOSUB20:PRINTRT$" AMOUNT SEARCH{26 SPA
     CEs}":GOSUB70:GOSUB80
1402 INPUT"AMOUNT (NO $)";WC$:FORC=1TON:GOS
     UB76
1403 IFCA$(C)=B$ANDAM$(C)=WC$THENGOSUB35
1404 NEXTC:GOSUB90:GOTO700
1500 GOSUB20:PRINTRT$" EXIT & CLOSE ALL FIL
     ES{17 SPACEs}":PRINT:PRINT
1502 GOSUB2000:PRINT:INPUTA$:IFA$<>"Y"THEN70
     0
1504 POKE788,49:CLOSE1:CLOSE2:CLOSE15:END
1700 GOSUB20:PRINTRT$" SCRATCH A FILE{25 SP
     ACEs}":GOSUB27
1702 GOSUB2000:INPUTA$:IFA$<>"Y"THEN5000
1704 GOSUB27:PRINT"NAME FILE TO SCRATCH":IN
     PUTNN$:GOSUB2000
1705 INPUTA$:IFA$<>"Y"THEN5000
1706 GOSUB24:PRINT#15,"S0:"+NN$
1708 GOSUB26:PRINTRT$;NN$;" SCRATCHED":GOSU
     B22:GOTO500
2000 PRINTCHR$(147)
2010 PRINTRT$" HELP !{32 SPACEs}":PRINT
2020 PRINTRT$" CATEGORIES TWO{9 SPACEs}"
2025 PRINT"I NCOME","D EDUCTION"
2030 PRINTRT$" SUB CATEGORY *INCOME{3 SPACE
     s}"
2040 PRINT"W AGES","F ARM","D IVIDEND","O T
     HER"
2045 PRINT"I NTEREST","R ENTAL","B USINESS"
2050 PRINTRT$" SUB CATEGORY *DEDUCTION"
2060 PRINT"I NTEREST","M EDICAL","E DUCATIO
     N"
2065 PRINT"B USINESS","T AX","C ONTRIBUTION
     "
2067 PRINT"O THER",,"R ETIREMENT FUND"
2100 PRINTRT$" SOURCE{17 SPACEs}"
2110 PRINT"MINIMUM 4 LETTERS - MAXIMUM 10 L
     ETTERS"
2120 PRINTRT$"DATE{2 SPACEs}(MONTH-DAY){7 S
     PACEs}"
2125 PRINT"EXAMPLE:04-28{2 SPACEs}(5 LETTER
     S)"
2130 PRINTRT$" RECORD/RECEIPT{9 SPACEs}"
2140 PRINT"EXAMPLE:CK#123 (MAX 6 LETTERS)"
2150 PRINTRT$" AMOUNT{17 SPACEs}"
2160 PRINT"NO'$' (DOLLAR SIGN)"
2180 PRINT:GOSUB22
2200 IFH=1THEN500
2210 IFH<>1THEN700
5500 GOSUB20
5510 PRINT"RECALL FILE":PRINT
5515 PRINT:INPUT"NAME FILE TO RECALL";N$
5520 IFLEN(N$)<1ORLEN(N$)>16THENPRINTU$:GOT
     O5515
5524 OPEN1,8,2,"0:"+N$+",S,R":C=0:GOSUB26
5525 IFX6$="62"THENCLOSE1:ZA=0:GOTO5536
5526 C=0
5527 C=C+1
5529 INPUT#1,CA$(C),SC$(C),SO$(C),DA$(C),RE
     $(C),AM$(C):S=ST
5530 GOSUB35
5532 IFS=0GOTO5527
5534 N=C:CLOSE1:PRINT"TOTAL COUNT: "N" RECO
     RDS":IP$="{2 SPACEs}":GOSUB100:PRINT
5536 GOSUB22:GOTO500
7000 GOSUB20:PRINTRT$" CREATE A NEW FILE{22
      SPACEs}"
7010 IP$="NAME NEW FILE":GOSUB100:PRINT:INP
     UTN$
```


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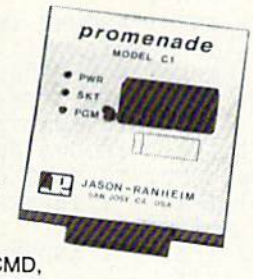

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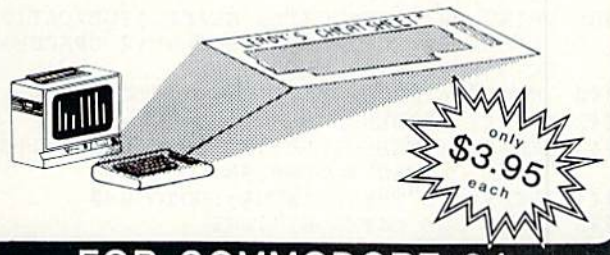

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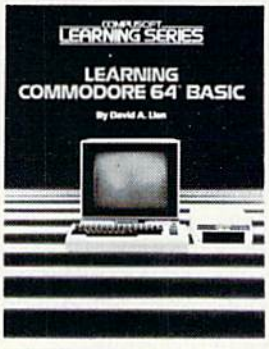

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Listing 1 continued.

```
7020 OPEN1,8,2,"@0:"+N$+",S,W"
7025 GOSUB21:GOSUB20:IFX7$<>"OK"THEN7010
7030 PRINTRT$"CATEGORY: "R0$SPC(2)RT$" ! "R
     O$" CLOSE FILE"
7035 PRINT:PRINTRT$"CAT{2 SPACEs}SUB/CAT{2
     SPACEs}SOURCE{2 SPACEs}DATE{2 SPACEs}R
     EC{3 SPACEs}AMOUNT"
7040 INPUT"CATEGORY (I) (D) (!)";CA$
7042 IFCA$="I"THEN7045
7043 IFCA$="!"THENCLOSE1:GOSUB20:PRINT:IP$=
     "FILE CLOSED":GOSUB100:GOTO500
7044 IFCA$<>"D"THENPRINTU$;:GOTO7040
7045 INPUT"SUB CATEGORY";SC$
7046 IFCA$="D"THEN7056
7048 IFSC$="W"ORSC$="F"ORSC$="D"ORSC$="I"OR
     SC$="R"THEN7060
7052 IFSC$="B"ORSC$="O"THEN7060
7054 PRINTU$;:GOTO7045
7056 IFSC$="I"ORSC$="M"ORSC$="E"ORSC$="T"OR
     SC$="C"THEN7060
7058 IFCA$="D"ANDSC$="R"ORSC$="B"ORSC$="O"T
     HEN7060
7059 PRINTU$;:GOTO7045
7060 INPUT"SOURCE (MIN/4 MAX/10)";SO$
7062 IFLEN(SO$)<4ORLEN(SO$)>10THENPRINTU$;:
     GOTO7060
7065 PRINT"DATE - MONTH-DAY -"
7066 PRINTRT$"EXAMPLE->{4 SPACEs}04-29"RO$;
     :INPUTDA$
7067 IFLEN(DA$)<>5THENPRINTU$;:GOTO7066
7070 PRINT"RECORD/RECEIPT (MAX 6 LETTERS)"
7071 PRINTRT$"EXAMPLE->{2 SPACEs}CK#134"RO$
     ;:INPUTRE$
7072 IFLEN(RE$)<1ORLEN(RE$)>6THENPRINTU$;:G
     OTO7071
7075 INPUT"AMOUNT (NO $ SYMBOLS)";AM$
7076 IFLEFT$(AM$,1)<CHR$(46)ORLEFT$(AM$,1)>
     CHR$(57)THENPRINTU$;:GOTO7075
7077 IFLEFT$(RIGHT$(AM$,3),1)<>CHR$(46)THEN
     PRINTU$;:GOTO7075
7078 IP$="":GOSUB100:PRINT
7080 INPUT"IS THIS CORRECT (Y/N)";A$
7081 IFA$<>"Y"THENPRINTCHR$(19):FORX=1TO6:P
     RINT:NEXTX
7082 IFA$<>"Y"ANDHZ=1THENFORX=1TO5:PRINT:NE
     XTX
7083 IFA$<>"Y"THEN7040
7084 IFGZ=1THENWF=1:RETURN
7085 PRINT#1,CA$:PRINT#1,SC$:PRINT#1,SO$:PR
     INT#1,DA$:PRINT#1,RE$:PRINT#1,AM$
7087 GOSUB16:WF=0
7090 A$="N":GOTO7081
7200 GOSUB20
7205 PRINTRT$"ADD DATA TO ";N$:GOSUB27
7210 GZ=1:GOSUB7035
7215 IFCA$="!"THEN5000
7220 N=N+1:CA$(N)=CA$:SC$(N)=SC$:SO$(N)=SO$
     :DA$(N)=DA$:RE$(N)=RE$:AM$(N)=AM$
7240 IP$="ADDED{4 SPACEs}":GOSUB100:PRINTU$
     :GOSUB16
7250 INPUT"ADD MORE (Y/N)";K$:IP$=" ":GOSUB
     100:PRINT
7251 IFK$="Y"THENPRINTCHR$(19):FORX=1TO4:PR
     INT:NEXTX:GOTO7210
7252 GOTO5000
7400 GOSUB20:PRINTRT$"DELETE FROM FILE ";N$
     :GOSUB27
7406 GOSUB50:IFE=1THENWF=0:GOTO5000
7410 N=N-1:FORD=CTON
7412 CA$(D)=CA$(D+1):SC$(D)=SC$(D+1):SO$(D)
     =SO$(D+1):DA$(D)=DA$(D+1)
7414 RE$(D)=RE$(D+1):AM$(D)=AM$(D+1):NEXTD
7418 IP$="RECORD DELETED":GOSUB100:PRINT:WF
     =1:GOTO5000
7600 GOSUB20
7605 PRINTRT$"CHANGE DATA IN ";N$:GOSUB21
7610 GOSUB50:IFE=1THENWF=0:GOTO5000
7620 GZ=1:HZ=1
7625 GOSUB7040:WF=1
7630 CA$(C)=CA$:SC$(C)=SC$:SO$(C)=SO$:DA$(C
     )=DA$:RE$(C)=RE$:AM$(C)=AM$
7635 IP$="DATA CHANGED":GOSUB100:PRINT:GZ=0
     :HZ=0:GOTO5000
7800 GOSUB20
7810 PRINTRT$" MERGE TWO FILES{24 SPACEs}"
7820 PRINT:INPUT"ENTER FIRST FILE NAME";F1$
7830 PRINT:PRINT:INPUT"ENTER SECOND FILE NA
     ME";F2$
7835 GOSUB27
7840 PRINT:PRINT:INPUT"ENTER{2 SPACEs}NEW F
     ILE NAME";F3$
7850 PRINT:PRINTRT$" IS THIS CORRECT? (Y/N)
     {17 SPACEs}"
7860 GETA$:IFA$=""THEN7860
7870 IFA$="Y"THEN7890
7875 IFA$="N"THEN7800
7880 IFA$<>"N"THEN7860
7890 GOSUB20:PRINT"<MERGING FILES>"
7895 PRINT#15,"C0:"+F3$+"=0:"+F1$+",0:"+F2$
     "
7898 GOSUB26:PRINT:IP$=" ":GOSUB100
7900 PRINT"IF DISK STATUS IS OKAY - MERGE C
     OMPLETE":PRINT:PRINT
7910 GOSUB22:GOTO5000
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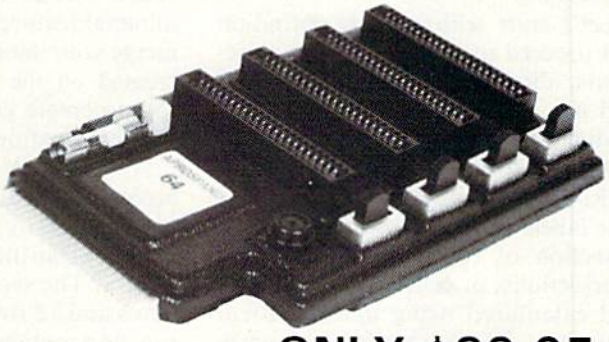

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The Plus/4's Spreadsheet and Graph-maker

By MARGARET MORABITO

Here's a look at two more of the Plus/4's built-in software programs.

The 64K Plus/4 is Commodore's newest computer. It contains several built-in programs: a word processor, spreadsheet, graphics program, database and a machine language monitor. Selling at less than $300, the Plus/4 is one of the most versatile and productive home computers on today's market.

This article, covering the spreadsheet, is the second of several reviews on the Plus/4's built-in programs. (See *RUN*'s December 1984 issue for a full discussion of the Plus/4 word processor.)

Let's start with a short definition and proceed to the hardware requirements, directions on getting started and the spreadsheet's features, including its strengths and weaknesses.

A spreadsheet is a multicolumn, multi-row document that holds specific labels and values within each intersection of row and column. The intersections, or cells, can be grouped and calculated using mathematical formulas. Spreadsheets are mostly used in preparing financial and budgeting reports for home or business.

How to Get Started

To fully tap the Plus/4 spreadsheet's capabilities, you will need a disk drive, a monitor or TV, and a printer (optional). Documentation accompanying the Plus/4 includes an in-depth manual, which offers a step-by-step tutorial filled with exercises that assist you in becoming fluent at spreadsheet manipulation.

To access the spreadsheet, press f1 after powering up. Then, at the SYS message, press the return key. You are now in the word processor, which is the stepping-off point for all of the Plus/4 application programs. Press the Commodore (CMD) and C keys simultaneously, type tc and press the return key. The screen will instantly change to the spreadsheet. (See Photo 1 for spreadsheet in use.)

The Plus/4 spreadsheet program contains features common to most good-quality spreadsheets. It lets you enter and modify data, enter formulas and calculate figures, and save and print your information. This spreadsheet, however, goes beyond these minimal features. It also allows you to merge your data with reports or letters created on the built-in word processor, to create graphs and print all of this information.

A maximum of 850 cells can be accommodated: 50 rows by 17 columns. This is plenty of space for monthly statistics and totals for yearly figures. The screen displays three columns and 12 rows at one time. (Rows run horizontally; columns run vertically.) Each cell can hold 36 characters, with up to 11 visible on screen. If you change a number within the spreadsheet, all previous calculations will be refigured by activating Auto mode.

The spreadsheet is command-driven, Command mode being initiated by pressing the CMD and C keys simultaneously. This actually makes for quicker manipulation time than with a menu-driven program. Cursor movement throughout has been carefully planned for flexibility of use and is controlled in several ways: the up and down cursor keys, f2 and f1 for right or left movement, a GOTO command for movement to a specified cell, and the Home command for cursor placement in the upper left corner.

For editing, movement inside each cell is done with the left and right cursor keys and the insert and delete keys. As you move your cursor beyond the coordinates of the screen display, the scrolling technique, seen also in the word processor, becomes active, enabling you to see any of the 850 cells.

What It Features

The three modes of data entry—Numeric, Text and Formula—are quite simple to use.

To enter a number, just move your cursor to the cell that you want filled, type your number and press the return key. As you type, your characters appear at the bottom of the spreadsheet on the status line. It is only after you press the return key that they are placed within the matrix. You may enter whole numbers, two-digit decimals for money and floating-point numbers (multi-digit decimals).

To enter words for labels and descriptions, you need only activate Text mode, easily done by pressing the CMD and T keys simultaneously. Once your desired cell coordinates are displayed on the status line, you just type your word and press the return key.

To access the Formula mode, press the CMD and F keys simultaneously. (Notice that all commands are preceded by the Commodore key.) In order to create an accurate formula, you need to decide which cells you want acted upon and where you want your

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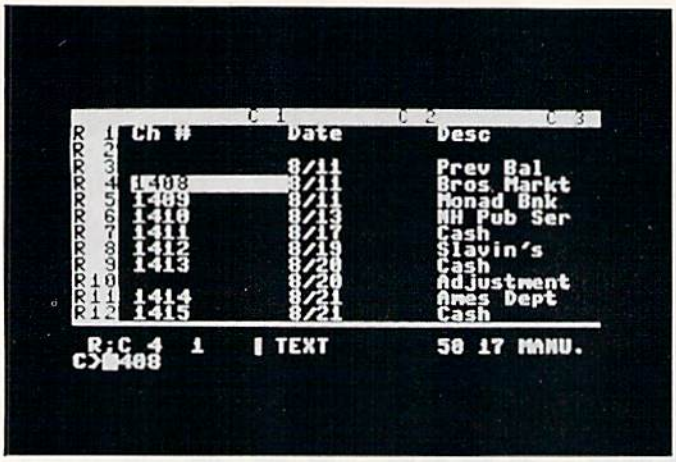
C 1 C 2 C 3
R 1 Ch # Date Desc
R 2
R 3 8/11 Prev Bal
R 4 1408 8/11 Bros Markt
R 5 1409 8/11 Monad Bnk
R 6 1410 8/13 NH Pub Ser
R 7 1411 8/17 Cash
R 8 1412 8/19 Slavin's
R 9 1413 8/20 Cash
R 10 8/20 Adjustment
R 11 1414 8/21 Awes Dept
R 12 1415 8/21 Cash
R;C 4 1 | TEXT 50 17 MANU.
C>1408

Photo 1. A full-screen view of the Plus/4 Spreadsheet in use.

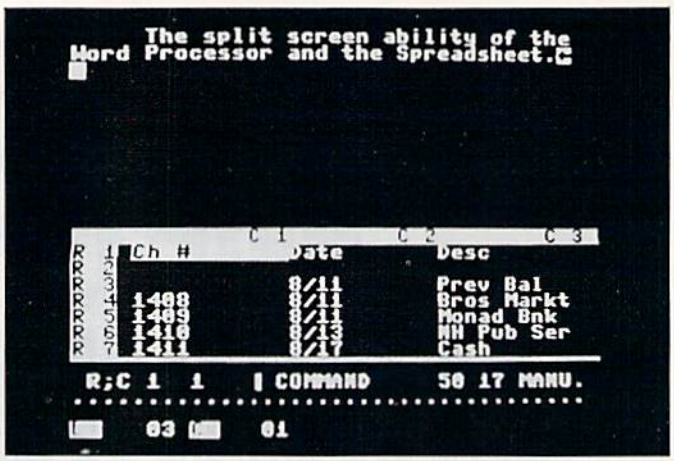
The split screen ability of the
Word Processor and the Spreadsheet.
C 1 C 2 C 3
Ch # Date Desc
1408 8/11 Prev Bal
1409 8/11 Bros Markt
1410 8/13 Monad Bnk
1411 8/17 NH Pub Ser
Cash
R;C 1 1 | COMMAND 50 17 MANU.
03 01

Photo 2. A split-screen view of the Plus/4 Spreadsheet and Word Processor.

answer stored. When in doubt about the coordinates of a cell, place your cursor in that cell and read the row and column numbers at the bottom of your screen.

The Formula mode is easy to use. For example, by typing in SUM and the coordinates of the first and the last cells to be added, you can get the total of all cells in a column or row.

For more complex calculations, you will be pleased to discover that fourteen operations are available, ranging from the most commonly used addition, subtraction, multiplication and division to the more intricate absolute value, arctangent, cosine, exponentiation, logarithm, sine and tangent. A logical expression evaluator is also helpfully included in the form of the Iftrue command.

Beyond the arithmetic commands, there are 35 others, allowing you to duplicate a row or column of data, delete or insert a row or column, copy a cell's data or formula into another, activate Automatic Calculation mode, change screen color, repeat a previous command, freeze a cell's value so that it cannot be changed and cancel a freeze.

Disk commands let you see the directory, save and load files, delete a file, initialize your disk and format a new disk. You can also erase your spreadsheet from memory and command left or right justification of numbers or text in the cells.

Extra Value

The Plus/4 spreadsheet is impressive by itself, but its value multiplies when you integrate it with the word processor and the graphing program. Integrated software refers to two or more software programs that can be used simultaneously to display, manipulate and print information.

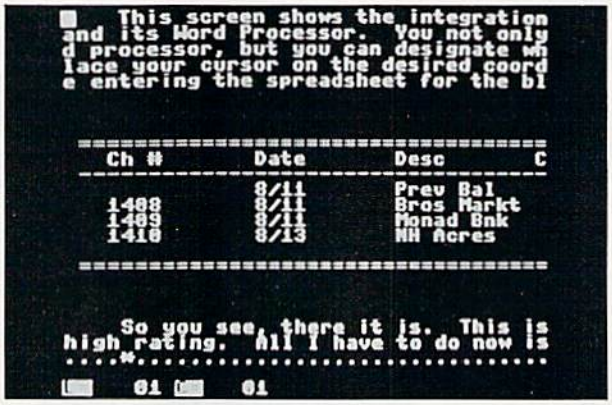
This screen shows the integration
and its Word Processor. You not only
d processor, but you can designate wh
lace your cursor on the desired coord
e entering the spreadsheet for the bl
Ch # Date Desc C
8/11 Prev Bal
1408 8/11 Bros Markt
1409 8/11 Monad Bnk
1410 8/13 NH Acres
So you see, there it is. This is
high rating. All I have to do now is
01 01

Photo 3. A word processing document holding spreadsheet information.

The spreadsheet and word processor are integrated in several ways. First, you can visually move back and forth from one to the other. Second, you can view both on your screen at once through the operation of a split screen. (See Photo 2.) Third, you can actually transfer information from the spreadsheet into a word processor's document and then continue to type the rest of it. (See Photo 3.) The main reason for transferring data into a word processor is to place it into a letter or report. All printing functions on the Plus/4 stem from the word processor. This is another reason for data transferral from the spreadsheet.

The second software package that interacts with the Plus/4 spreadsheet is the graph-making program. This program lets you graph any row of data, using simple low-resolution bar or point graphs. Although the Plus/4 has a sophisticated high-resolution color graphics program built in, it cannot be used for spreadsheet graphing. Commodore deliberately used low-resolution graphing so that when the graph was merged into the word processor, the information could be printed on any Commodore printer.

The graph program is adequate, but offers less than some advertisements imply. A coming issue of *RUN* will review the high-resolution color graphics program of the Plus/4.

Most commands in this spreadsheet are easy to learn and remember, but some might be awkward for a new user. The Fit command, which copies a formula from one cell into another, is an example. The manual doesn't provide enough exercises, so you end up doing a lot of trial and error learning. The creation of advanced formulas can be overbearing. Again, the manual does not include enough samples.

Nevertheless, the versatility and ease of this spreadsheet far outweigh the few shortcomings. You won't really appreciate what Commodore has done until you start to experiment with the integration of the built-in programs. This is by far the greatest strength of the Plus/4's applications software. R

Address all author correspondence to Margaret Morabito, c/o RUN *editorial, 80 Pine St., Peterborough, NH 03458.*

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Scrambler

By CHUCK McGAFFIN

How good are you at unscrambling words or phrases? In this word game, you must decipher a computer-scrambled word or phrase entered by your opponent. Points are awarded based on the length of the word or phrase and the number of tries taken to correctly unscramble it.

Scrambler starts with a player typing in a word or phrase that cannot be longer than 30 characters on the Commodore 64 and 15 characters on the VIC-20.

If the input word or phrase cannot be scrambled (for example, "A" or "XXX"), the program will discard the entry and request a new one.

The computer scrambles not only letters, but also numbers, symbols and spaces, then checks to be sure that the scrambled result is different from the original word or phrase. Next, it displays the scrambled result and prompts the player for input of the first character guessed.

As each correct letter is chosen, the completed portion of the unscrambled word is displayed, and the scrambled word is updated to show only those characters remaining. You are then prompted to enter the next character. Wrong guesses are highlighted with a musical reprimand.

When the word or phrase has been successfully unscrambled, the player's score is computed according to the length of the word or phrase and the number of errors made during play. The score is then displayed, and Scrambler waits for the player to hit the return key. This pause allows players to inspect the correct word or phrase and the resulting word score before proceeding to the next puzzler.

The VIC-20 version of Scrambler is limited to the input of one word or phrase at a time, while the Commodore 64 version allows each of several players to input a set of words or phrases at the beginning of play.

The running score of each player is displayed along with the score obtained for the current word. The computer prints a prompt to identify which player is to make an entry or to unscramble the currently displayed word or phrase.

Scrambler is a simple yet enjoyable game for young and old. The game also can be used in conjunction with vocabulary lists as a fun way to help children learn to spell.

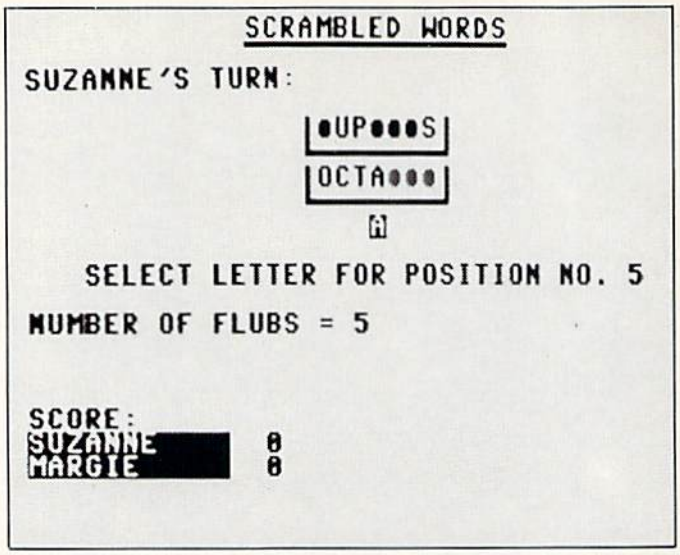
Type in the program, save it on tape or disk and run it to begin play.

To conserve memory, the VIC-20 version of Scrambler is limited to one word or phrase at a time. If you have memory expansion, you can easily modify the Commodore 64 version to work on the VIC-20. Aside from the obvious differences between the 40-column and 22-column screens, the only other differences are the initial Pokes to set screen, border and character colors and the sound subroutines (lines 320–360 in the 64 version and lines 245–280 in the VIC version). R

Address all author correspondence to Chuck McGaffin, 21 Maple Ridge, Ballston Lake, NY 12019.

RUN It Right

Commodore 64
Unexpanded VIC-20



Listing 1. *Scrambler program for the C-64.*

```
5 REM SCRAMBLED WORDS 64
1Ø SI=54272:KP=Ø
15 POKE5328Ø,1:POKE53281,1:POKE646,6
2Ø DIM WL$(3Ø),RI(3Ø)
25 GOSUB455:INPUT"{2 CRSR DNs}HOW MANY PLAY
   ERS";PL:IFPL=ØTHENPL=1
3Ø INPUT"{2 CRSR DNs}HOW MANY WORDS TO ENTE
   R";NW:IFNW=ØTHENNW=1
35 DIMWD$(PL-1,NW-1),WL(PL-1,NW-1),N$(PL-1)
   ,PS(PL-1)
4Ø FORK=ØTOPL-1
45 GOSUB455:PRINT"{2 CRSR DNs}PLAYER";K+1;"
   'S NAME";:INPUTN$(K)
5Ø FORX=ØTONW-1
55 PRINT"{HOME}{2 CRSR DNs}"N$(K)"!{CTRL 7}
   "
6Ø PRINT"{CRSR DN}ENTER ONE WORD OR PHRASE
   TO BE SCRAMBLED";
65 PRINT"{7 SPACEs}(LIMITED TO 3Ø CHARACTER
   S){2 CRSR DNs}"
7Ø PRINT"{CRSR DN}{4 CRSR RTs}{CTRL 3}{COMD
    Z}";:FORJ=ØTO29:PRINT"{SHFT C}";:NEXT:P
   RINT"{COMD X}{CTRL 7}"
75 PRINT"{HOME}{8 CRSR DNs}";:GOSUB365
8Ø L=LEN(W$):IFL>3ØTHENGOSUB455:GOTO55
85 IFL=ØTHEN75
9Ø IFL=1THEN75
95 GOSUB465:GOSUB47Ø:IFR=1THENGOSUB465:GOTO
   75
1ØØ WD$(K,X)=W$:WL(K,X)=L:NEXTX,K
1Ø5 FORZ=ØTONW-1:YY=Ø:FORY=PL-1TOØSTEP-1:YY
   =YY+1:GOSUB455
11Ø W$=WD$(Y,Z):L=WL(Y,Z):SC=PS(YY-1):WS=L*
   2ØØ
115 PRINT"{HOME}{1Ø CRSR DNs}{CTRL 3}"TAB(1
   4)"{CTRL 9}SCRAMBLING{CTRL 7}{CTRL Ø}"
12Ø FORJ=1TOL:WL$(J)=MID$(W$,J,1):NEXT
125 FORJ=1TOL:RI(J)=Ø:NEXT:GOSUB32Ø:GOSUB34
   5:FORJ=1TOL
13Ø I=INT(RND(Ø)*L)+1
135 FORC=1TOJ:IFRI(C)=ITHENC=J:NEXTC:GOTO13
   Ø
14Ø NEXTC:RI(J)=I:NEXTJ
145 SW$="":FORJ=1TOL:SW$=SW$+WL$(RI(J)):NEX
   T:IFSW$=W$THEN125
15Ø GOSUB455:GOSUB485:C=(38-L)/2
155 PRINT"{2 CRSR DNs}"TAB(C);:PRINT"{CTRL
   3}{SHFT -}{CTRL 7}";SW$;"{CTRL 3}{SHFT
   -}{CTRL 7}"
16Ø PRINTTAB(C)"{CTRL 3}{COMD Z}";
165 FORJ=1TOL:PRINT"{SHFT C}";:NEXT:PRINT"{
   COMD X}{CTRL 7}"
17Ø PRINTTAB(C)"{CTRL 3}{SHFT -}{CTRL 7}";
175 FORJ=1TOL:PRINT"{CTRL 6}{SHFT Q}{CTRL 7
   }";:NEXT:PRINT"{CTRL 3}{SHFT -}{CTRL 7}
   "
18Ø PRINTTAB(C)"{CTRL 3}{COMD Z}";
185 FORJ=1TOL:PRINT"{SHFT C}";:NEXT:PRINT"{
   COMD X}{CTRL 7}"
19Ø E=Ø:FORN=1TOL
195 PRINT"{HOME}{1Ø CRSR DNs}{3 SPACEs}SELE
   CT LETTER FOR POSITION NO.{CTRL 3}";N;"
   {CTRL 7}"
2ØØ GETL$:IFL$=""THEN2ØØ
2Ø5 PRINT"{HOME}{8 CRSR DNs}"TAB(19)"{CTRL
   3}{CTRL 9}"L$"{CTRL Ø}{CTRL 7}"
21Ø IFL$=WL$(N)THEN225
215 E=E+1:GOSUB32Ø:GOSUB355:PRINT"{HOME}{12
    CRSR DNs}NUMBER OF FLUBS ={CTRL 3}";E;
   "{CTRL 7}"
22Ø GOTO195
225 FORJ=1TOL:IFRI(J)=NTHENI=J:J=L:NEXT:GOT
   O235
23Ø NEXT
235 GOSUB32Ø:GOSUB325
24Ø SL$=LEFT$(SW$,I-1):SR$=RIGHT$(SW$,L-I):
   SW$=SL$+"{SHFT Q}"+SR$
245 PRINT"{HOME}{3 CRSR DNs}":PRINTTAB(C)"{
   CTRL 3}{SHFT -}{CTRL 7}";SW$;"{CTRL 3}{
   SHFT -}{CTRL 7}{CRSR DN}"
25Ø PRINT"{HOME}{6 CRSR DNs}";:PRINTTAB(C)"
   {CTRL 3}{SHFT -}{CTRL 7}";
255 FORJ=1TON:PRINTWL$(J);:NEXT:NEXT
26Ø PRINT"{HOME}{9 CRSR DNs}{4Ø SPACEs}"
265 WS=WS-5Ø*E:B=(L-E)*25:IFB<ØTHENB=Ø
27Ø SC=SC+WS+B:PRINT"{3 CRSR DNs}WORD SCORE
    ={CTRL 3}";WS+B;"{CTRL 7}"
275 PS(YY-1)=SC:GOSUB49Ø
28Ø PRINT"{HOME}{22 CRSR DNs}"TAB(7)"TYPE R
   ETURN TO CONTINUE!
285 GETA$:IFA$=""THEN285
29Ø IFA$<>CHR$(13)THEN285
295 GOSUB455:NEXTY,Z
3ØØ GOSUB455:GOSUB34Ø:GOSUB495
3Ø5 PRINT"{3 CRSR DNs}PLAY AGAIN? (Y/N)";:I
   NPUTA$
31Ø IFA$="Y"THENCLR:GOTO1Ø
315 PRINT"{SHFT CLR}":END
32Ø GOSUB34Ø:POKESI+24,15:RETURN
325 POKESI+5,12:POKESI+6,9
33Ø KP=KP*(KP<1Ø)*(-1)+1:POKESI+1,KP*1.5+KP
   :POKESI+15,19+KP:POKESI+4,21
335 FORQ=1TO5:POKESI,Q*25:NEXT:RETURN
34Ø FORR=SITOSI+24:POKER,Ø:NEXT:RETURN
345 POKESI+5,5Ø:FORX=1TO5Ø:POKESI+1,RND(X)*
   32+5Ø:POKESI+4,17
35Ø FORA=1TO1Ø:NEXT:POKESI+4,16:NEXT:RETURN
355 POKESI+6,24Ø:POKESI+4,17:FORA=1TO1Ø:FOR
   X=1TO255STEP25:POKESI+1,X:NEXT:NEXT
36Ø POKESI+4,32:RETURN
365 PRINT"{5 CRSR RTs}";
37Ø W$="":CC%=Ø
375 GOSUB44Ø:IFA$=CHR$(13)THENRETURN
38Ø IFA$=CHR$(34)THEN375
385 IFA$<CHR$(32)THEN375
39Ø IFA$>CHR$(127)THEN375
395 GOTO435
4ØØ GOSUB44Ø:IFA$=CHR$(13)THENRETURN
4Ø5 IFA$=CHR$(2Ø)THEN425
41Ø IFA$<CHR$(32)ORA$>CHR$(127)THEN4ØØ
```

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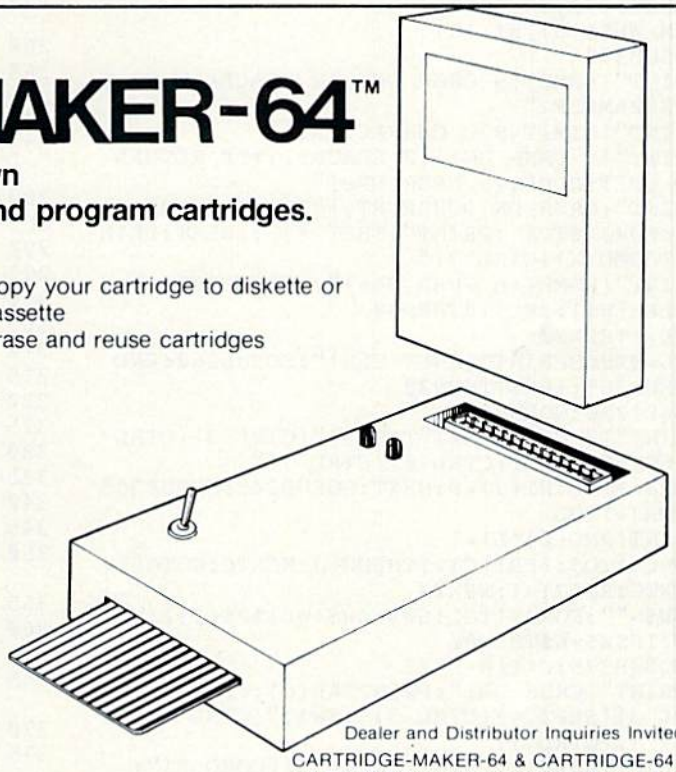

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Listing 1 continued.

```
415 IFA$=CHR$(34)THEN4ØØ
42Ø GOTO435
425 CC%=CC%-1:IFCC%<ØTHEN37Ø
43Ø W$=LEFT$(W$,CC%):PRINT"{CRSR LF} {CRSR
    LF}";:GOTO4ØØ
435 PRINTA$;:W$=W$+A$:CC%=CC%+1:GOTO4ØØ
44Ø PRINT"{CTRL 9} {CTRL Ø}";:FORJ=ØTO5Ø:GE
    TA$:IFA$<>""THENJ=5Ø:NEXT:GOTO45Ø
445 NEXT:PRINT"{CRSR LF} {CRSR LF}";:FORJ=Ø
    TO5Ø:NEXT:GOTO44Ø
45Ø PRINT"{CRSR LF} {CRSR LF}";:RETURN
455 PRINT"{SHFT CLR}"TAB(12)"SCRAMBLED WORD
    S"
46Ø PRINTTAB(12)"{CTRL 3}{15 COMD Ys}{CTRL
    7}":RETURN
465 PRINT"{HOME}{8 CRSR DNs}{4Ø SPACEs}";:R
    ETURN
47Ø FORJ=1TOL:WL$(J)=MID$(W$,J,1):NEXT
475 R=Ø:FORJ=2TOL:IFWL$(1)<>WL$(J)THENJ=L:R
    ETURN
48Ø NEXT:R=1:RETURN
485 PRINT"{HOME}{2 CRSR DNs}"N$(YY-1)"'S TU
    RN:"
49Ø PRINT"{HOME}{16 CRSR DNs}SCORE:"
495 FORZZ=ØTOPL-1:NN$=N$(ZZ):LL=LEN(NN$):FO
    RXX=LLTO1Ø:NN$=NN$+" ":NEXT
5ØØ PRINT"{CTRL 9}"NN$"{CTRL Ø} {CTRL 3}"PS
    (ZZ)"{CTRL 7}":NEXT
5Ø5 PRINT"{HOME}{CRSR DN}":RETURN
```

Listing 2. *Scrambler program for the VIC-20.*

```
5 REM SCRAMBLED WORDS VIC
1Ø POKE36879,25:POKE646,6
15 DIM WL$(18),RI(18)
2Ø GOSUB375
25 PRINT"{HOME}{9 CRSR DNs}{2 SPACEs}WORD T
   O SCRAMBLE?"
3Ø PRINT"(LIMIT @18 CHARACTERS)"
35 PRINT"{4 CRSR DNs}{2 SPACEs}TYPE RETURN
   TO QUIT{HOME}{5 CRSR DNs}"
4Ø PRINT"{CRSR DN}{CRSR RT}{CTRL 3}{COMD Z}
   ";:FORJ=ØTO17:PRINT"{SHFT *}";:NEXT:PRIN
   T"{COMD X}{CTRL 7}"
45 PRINT"{HOME}{6 CRSR DNs}";:GOSUB285
5Ø L=LEN(W$):IFL>18THEN2Ø
55 IFL=1THEN2Ø
6Ø IFL=ØTHENPRINT"{SHFT CLR}":GOSUB26Ø:END
65 GOSUB385:IFR=1THEN2Ø
7Ø WS=L*2ØØ:GOSUB375
75 PRINT"{7 CRSR DNs}"TAB(5)"{CTRL 3}{CTRL
   9}SCRAMBLING!{CTRL Ø}{CTRL 7}"
8Ø FORJ=1TOL:RI(J)=Ø:NEXT:GOSUB245:GOSUB265
   :FORJ=1TOL
85 I=INT(RND(Ø)*L)+1
9Ø FORC=1TOJ:IFRI(C)=ITHENC=J:NEXTC:GOTO85
95 NEXTC:RI(J)=I:NEXTJ
1ØØ SW$="":FORJ=1TOL:SW$=SW$+WL$(RI(J)):NEX
   T:IFSW$=W$THEN8Ø
1Ø5 GOSUB375:C=(18-L)/2
11Ø PRINT"{CRSR DN}":PRINTTAB(C);:PRINT"{CT
   RL 3}{SHFT -}{CTRL 7}";SW$;"{CTRL 3}{SH
   FT -}{CTRL 7}"
115 PRINTTAB(C);:PRINT"{CTRL 3}{COMD Z}";
12Ø FORJ=1TOL:PRINT"{SHFT *}";:NEXT:PRINT"{
   COMD X}{CTRL 7}"
125 PRINTTAB(C);:PRINT"{CTRL 3}{SHFT -}{CTR
   L 7}";
13Ø FORJ=1TOL:PRINT"{CTRL 6}{SHFT Q}{CTRL 7
   }";:NEXT:PRINT"{CTRL 3}{SHFT -}{CTRL 7}
   "
135 PRINTTAB(C);:PRINT"{CTRL 3}{COMD Z}";
14Ø FORJ=1TOL:PRINT"{SHFT *}";:NEXT:PRINT"{
   COMD X}{CTRL 7}"
145 E=Ø:FORN=1TOL
15Ø PRINT"{HOME}{9 CRSR DNs}SELECT LETTER N
   O.{CTRL 3}";N;"{CTRL 7}"
155 GETL$:IFL$=""THEN155
16Ø IFL$=WL$(N)THEN175
165 E=E+1:GOSUB245:GOSUB275:PRINT"{HOME}{13
    CRSR DNs}NUMBER OF FLUBS ={CTRL 3}";E;
   "{CTRL 7}"
17Ø GOTO15Ø
175 FORJ=1TOL:IFRI(J)=NTHENI=J:J=L:NEXT:GOT
   O185
18Ø NEXT
185 GOSUB245:GOSUB25Ø
19Ø SL$=LEFT$(SW$,I-1):SR$=RIGHT$(SW$,L-I):
   SW$=SL$+"{SHFT Q}"+SR$
195 PRINT"{HOME}{3 CRSR DNs}":PRINTTAB(C)"{
   CTRL 3}{SHFT -}{CTRL 7}";SW$;"{CTRL 3}{
   SHFT -}{CTRL 7}{CRSR DN}"
2ØØ PRINT"{HOME}{6 CRSR DNs}";:PRINTTAB(C)"
   {CTRL 3}{SHFT -}{CTRL 7}";
2Ø5 FORJ=1TON:PRINTWL$(J);:NEXT:NEXT
21Ø PRINT"{HOME}{9 CRSR DNs}{4Ø SPACEs}"
215 WS=WS-5Ø*E:B=(L-E)*25:IFB<ØTHENB=Ø
22Ø SC=WS+B:PRINT"SCORE ={CTRL 3}";SC;"{CTR
   L 7}"
225 PRINT"{3 CRSR DNs}HIT RETURN TO CONTINU
   E"
23Ø GETA$:IFA$=""THEN23Ø
235 IFA$=CHR$(13)THENGOSUB375:GOTO25
24Ø GOTO23Ø
245 POKE36878,15:RETURN
25Ø POKE36876,22Ø:FORJJ=1TO5:NEXT:POKE36876
   ,Ø
255 FORJJ=ØTO5Ø:NEXT:POKE36876,2ØØ:FORJJ=1T
   O5:NEXT:POKE36876,Ø:RETURN
26Ø POKE36878,Ø:RETURN
265 FORJJ=1TO5Ø:POKE36876,INT(RND(1)*128)+1
   28:FORM=1TO5:NEXTM,JJ
27Ø POKE36876,Ø:RETURN
275 FORJJ=1TO3:FORM=2ØØTO22Ø+JJ*2:POKE36876
   ,M:NEXTM,JJ
28Ø POKE36876,Ø:RETURN
285 PRINT"{2 CRSR RTs}";
29Ø W$="":CC%=Ø
295 GOSUB36Ø:IFA$=CHR$(13)THENRETURN
3ØØ IFA$=CHR$(34)THEN295
3Ø5 IFA$<CHR$(32)THEN295
31Ø IFA$>CHR$(127)THEN295
315 GOTO355
32Ø GOSUB36Ø:IFA$=CHR$(13)THENRETURN
325 IFA$=CHR$(2Ø)THEN345
33Ø IFA$<CHR$(32)ORA$>CHR$(127)THEN32Ø
335 IFA$=CHR$(34)THEN32Ø
34Ø GOTO355
345 CC%=CC%-1:IFCC%<ØTHEN29Ø
35Ø W$=LEFT$(W$,CC%):PRINT"{CRSR LF} {CRSR
    LF}";:GOTO32Ø
355 PRINTA$;:W$=W$+A$:CC%=CC%+1:GOTO32Ø
36Ø PRINT"{CTRL 9} {CTRL Ø}";:FORJ=ØTO5Ø:GE
   TA$:IFA$<>""THENJ=5Ø:NEXT:GOTO37Ø
365 NEXT:PRINT"{CRSR LF} {CRSR LF}";:FORJ=Ø
   TO5Ø:NEXT:GOTO36Ø
37Ø PRINT"{CRSR LF} {CRSR LF}";:RETURN
375 PRINT"{SHFT CLR}***SCRAMBLED{2 SPACEs}W
   ORDS***";
38Ø PRINT"{3 SPACEs}{16 COMD Ys}":RETURN
385 FORJ=1TOL:WL$(J)=MID$(W$,J,1):NEXT
39Ø R=Ø:FORJ=2TOL:IFWL$(1)<>WL$(J)THENJ=L:R
   ETURN
395 NEXT:R=1:RETURN
```

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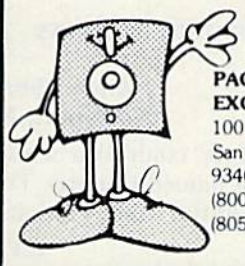

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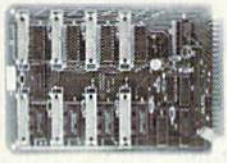

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From p. 10.

$197 Making Simon simpler—If you have Simon's Basic, using the Key function can save much time while developing a program. Saving the key setup routine onto tape or disk can provide additional savings. Just define your keys, enter DISPLAY and insert a line number before each key definition. After each line number is inserted, press the return key to add your new line to the program in memory. Then save this key-definition subroutine for future use. I have several such routines—one for program development, another for running programs and so on. Here are a few key lines to illustrate the principle:

```
58000 KEY1,"LIST" + CHR$(13)
58010 KEY2,"PAUSE 30" + CHR$(13)
58020 KEY3,"RENUMBER" + CHR$(13)
```

Susan Morrell
Lancaster, CA

$198 Disk backup improvement—The Commodore program Single Disk Backup V1.0, by Michael Schaff, is great, but slow. If you add a sound subroutine, the program can notify you each time you need to intervene, and you can do other things while your disk is being copied. Add the following lines.

```
1000 FOR L = 54272 TO 54296 : POKE L,0 : NEXT
1010 POKE 54296,15 : POKE 54277,128 : POKE 54278,128 : POKE
     54276,33
1020 POKE 54273,50 : POKE 54272,60
1030 FOR T = 1 TO 1500 : NEXT : POKE 54276,16 : FOR T = 1 TO
     100 : NEXT
1040 FOR L = 54272 TO 54296 : POKE L,0 : NEXT
1050 RETURN
```

If you insert GOSUB 1000's in lines 465, 540, 700, 720, 725, 865, 890 and 980, the program will signal you at the appropriate times. Start the program, turn up the volume and go about your business.

Ginger Scalet
Brookings, SD

$199 Sui generis—(These words are Latin for "in a class by itself"; they do describe this trick.) Trick $EE (*RUN*, October 1984) purports to translate English into Pig Latin. In true translation, words beginning with vowels do *not* have the initial letter transposed to the end; instead, the syllable "-way" is appended. Also, pure porcine philology moves initial consonant clusters to the end of the word as a group. The English "speak," therefore, is properly translated "eak-spay," rather than "peak-say," as translated by trick $EE. The accompanying program will perfectly translate any English word into Swine. Quod erat demonstrandum.

```
10Ø REM{2 SPACEs}PIG LATIN - ANNE ABBATE
11Ø PRINT
12Ø INPUT"ENGLISH";A$
13Ø L$=LEFT$(A$,1)
14Ø IFL$="A"ORL$="E"ORL$="I"ORL$="O"ORL$="U
    "THENB$=A$:A$="-WAY":GOTO21Ø
15Ø N=2:IFL$="Q"THEN N=3:GOTO2ØØ
16Ø M$=MID$(A$,N,1)
17Ø IFM$="A"ORM$="E"ORM$="I"ORM$="O"ORM$="U
    "THEN2ØØ
18Ø N=N+1:IFN>LEN(A$)THEN11Ø
19Ø GOTO16Ø
2ØØ B$=RIGHT$(A$,LEN(A$)-(N-1)):A$="-"+LEFT
    $(A$,N-1)+"AY"
21Ø PRINT:PRINT"{2 SPACEs}SWINE: ";B$;A$
22Ø GOTO11Ø
```

Anne Abbate
Northport, NY

Editor's Note: The phrase "sui generis" could also be used in the barnyard, to summon a hog named Generis. That makes it, then, in the truest sense of the word, Pig Latin.

L.F.S.

$19A Magic ML poker—Machine language programs are usually (and conveniently) listed as hexadecimal memory dumps, with an address and eight hex bytes on each line. In many cases, we convert those bytes to decimal form, then type them into Data statements, where a Basic program can read them and Poke them into memory. Unfortunately, this process often introduces errors, and since the Data statements bear little resemblance to the original ML listing, the errors can be *very* hard to find.

The accompanying program avoids these troubles, letting the original hex dump be used verbatim in the Data statements. It eliminates the use of commas and allows proofreading of Data statements against the original ML dump. Lines 100–170 are the program itself; the others are a test routine that Pokes some letters onto a C-64 screen.

To use the main program on your own ML, just delete the extra lines, then do this:

- In line 110, set variable BA to the decimal value of the ML's beginning address.
- Add your Data statements, each consisting of a line number, the word DATA and the data item as described below.
- Each Data item must consist of a four-hex-digit address, followed by any number of hex bytes (usually eight or fewer), all separated by single spaces. There must be no punctuation marks or other characters on the line. (Most hex listings are very close to this form already.)
- Add a final Data statement, of fewer than six characters, to mark the end of your ML. The number 999 works fine.
- Run the program. As it reads each Data statement, it ignores the four-character address, then checks that each other item is a valid hex byte. (If you type an I for a one, the poker will catch it, showing you the defective entry and the number of the line it's in. Hallelujah!) Finally, it converts the bytes to decimal and Pokes them into the proper locations.

```
1Ø REM{2 SPACEs}MAGIC ML POKER
2Ø POKE53281,1:PRINT"{SHFT CLR}":POKE53281,
   6
3Ø :
1ØØ REM{2 SPACEs}MAGIC ML POKER
1Ø5 REM{2 SPACEs}CREATED BY LOUIS F. SANDER
```

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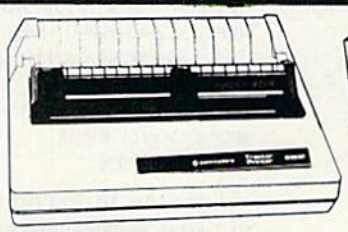

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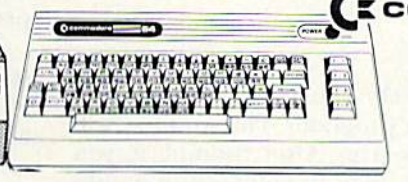

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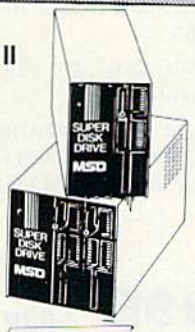

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```
11Ø BA=1Ø24:READHD$:HD$=MID$(HD$,6):IFHD$="
    "THEN17Ø
12Ø FORP=1TOLEN(HD$)STEP3:BY$=MID$(HD$,P,2)
13Ø HN=ASC(BY$)-48:HN=HN+7*(HN>9):IFHN<ØORH
    N>15THEN16Ø
14Ø LN=ASC(RIGHT$(BY$,1))-48:LN=LN+7*(LN>9)
    :IFLN<ØORLN>15THEN16Ø
15Ø POKEBA+Q,LN+16*HN:Q=Q+1:NEXT:GOTO11Ø
16Ø PRINT"ERROR IN"PEEK(63)+256*PEEK(64)":
    "BY$:END
17Ø PRINT"DONE!":END
1ØØØ :
1ØØ1 DATA Ø4ØØ Ø1 Ø2 Ø3 Ø4 Ø5 Ø6 Ø7 Ø8
1ØØ2 DATA Ø4Ø8 Ø9 ØA ØB ØC
1ØØ3 DATA 999
```

$19B Rick-rack—Do you need something to dress up a dull screen in a program? This routine will give you a colorful rick-rack trim. After running it, you can erase the Ready prompt, then fit your printing onto the screen without using the return key. This will help you plan an aesthetic format.

```
1Ø REM{2 SPACEs}RICK-RACK BY ELIZABETH OMAN
2Ø GOTO4Ø
3Ø FORX=1TO2Ø:PRINT"{CTRL 8}{CTRL 9}{COMD *
   }{SHFT LB.}{CTRL Ø}";:NEXT:FORX=1TO2Ø:PR
   INT"{COMD *}{SHFT LB.}";:NEXT:PRINT"{COM
   D 7}{HOME}":RETURN
4Ø PRINT"{SHFT CLR}":GOSUB3Ø:FORX=1TO2Ø:PRI
   NT:NEXT:GOSUB3Ø
```

Elizabeth Oman
Lindsborg, KS

**$19C Harmless disk directory**—Using the command Load"$",8 loads the 1541 disk directory into memory, overwriting any program that may already be there. You can avoid the overwriting by using these Direct mode commands:

```
POKE 44,PEEK(46)+1
LOAD "$",8
LIST
```

When you want to return to your Basic program, just type:

```
POKE 44,8
```

Karen Guzowski
South Burlington, VT

**$19D Sort subroutine**—You can use the accompanying subroutine to sort the items in any one-dimensional array. When called, it will sort string array S0$( ) into ascending order. Before calling it, you must make entries into S0$( ), then set variable S1 equal to the highest subscript of the entries you've made. S0$( ) can be dimensioned to any size, but only items S0$(1) through S0$(S1) will be sorted. S0$(0) is not sorted, nor is it counted in S1.

```
39999 REM ** MAGIC SORT SUBROUTINE **
40000 S2=S1
40001 S2=INT(S2/2) : IF S2=0 THEN 40009
40002 S3=1 : S4=S1-S2
40003 S5=S3
40004 S6=S5+S2 : IF S0$(S5)<S0$(S6) THEN 40007
40005 S7$=S0$(S5) : S0$(S5)=S0$(S6) : S0$(S6)=S7$ : S5=S5-
      S2 : IF S5<1 THEN 40007
40006 GOTO 40004
40007 S3=S3+1 : IF S3>S4 THEN 40001
40008 GOTO 40003
40009 RETURN
```

For your protection, the subroutine uses variables with unusual names; avoid using them in the rest of your program, and you'll avoid interference with the sort.

To sort into descending order, change the "less than" symbol in line 40004 to a "greater than" symbol. To sort an array other than S0$( ), change all the S0s in 40004 and 40005 to the name of the new array. To sort a numeric array S0( ), delete all the dollar signs in lines 40004 and 40005.

You can use the following program to test your subroutine.

```
10 FOR I=0TO9:READS0$(I):PRINTI;S0$(I):NEXT:PRINT
20 S1=9:GOSUB40000:FORI=0TO9:PRINTI;S0$(I):NEXT:END
30 DATA ZERO,H,A,I,G,D,B,C,F,E
```

Titania Queen
Staten Island, NY

$19E Logo tips—When using the Logo language on the C-64, you can use the run/stop key to get out of the Editor. Outside the Editor, you can repeat a line continuously by pressing the up arrow key. If you find that your lines or colors overlap, simply use the Doublecolor mode rather than the Singlecolor mode. And finally, in words and lists Logo, you can get multiple blank spaces by putting them inside apostrophes.

Valerie Ann Brown
Brownsburg, Quebec
Canada

$19F Editing in color—When editing a listing on the screen, it makes things easier if you change the color of your cursor before making your edits. If the listing is in blue on blue, for example, press CTRL 2 to change the cursor to white, then make your corrections. The changes will stand out on the screen, making it easy to see the results of your work.

Meredith Jones Frummer
Riverdale, NY

$1A0 Magic color change—The following short subroutine will display what you type in green, except for letters of the alphabet, which will appear in red. Commodore 64 users might want to enter POKE 53281,1 first, to get a white screen.

```
10 GET A$: IF A$="" THEN 10
20 PRINT CHR$(28-2*(ASC(A$)<65) OR (ASC(A$)>90))A$;:GOTO 10
```

Marilyn Sallee
Alliance, NE

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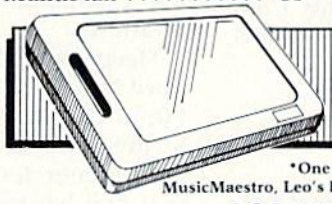

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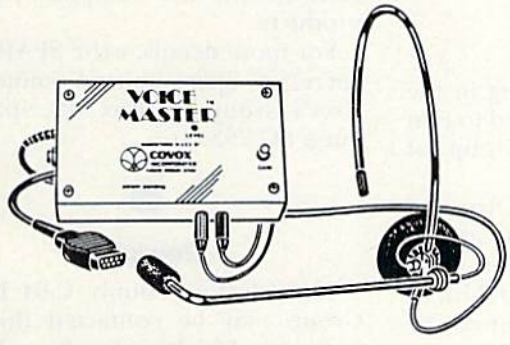

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Southern California

The Commodore 64 West user's club, which serves the western Los Angeles and Santa Monica area, has over 250 members and continues to grow.

The group's new address is Commodore 64 West, PO Box 406, Santa Monica, CA 90406–0406.

Western Cincinnati, OH

Westcom 64, a Commodore user's group in the western Cincinnati area, was organized to educate users of Commodore computers, as well as the general public.

For information, contact Rick Olano, 156 Citation Circle, Harrison, OH 45030, 513-367-2668.

Tennessee

Anyone living in the Memphis, TN area is invited to join the Memphis Commodore User's Club, which serves users of all Commodore computer systems.

The group offers an extensive public domain library, computer education instruction and a monthly newsletter, and meets on the first Tuesday of the month at the State Technical Institute (in Fulton Auditorium). For more details, write Memphis Commodore User's Club, PO Box 38095, Bartlett, TN 38134–0095.

Wisconsin

The Southwest Wisconsin User's Group meets every other Monday at 7:00 PM, in the University Student Center at Platteville.

Meetings include an exchange of software, as well as hints-and-help sessions. For more information, contact Shane Biller, Box 105, Platteville, WI 53818.

Fairfield, CA

The Fairfield Commodore User's Group holds its meetings on the first Monday and third Thursday of each month, beginning at 8:00 PM, at the Fairfield Community Center.

For more details, write Mike Riley, 200 Cambridge Drive, Vacaville, CA 95688.

Support Group

Commodore owners seeking advice on spreadsheets or word processors may contact A.T.S. Multiplan-Easyscript Support Group. Meetings are held every Monday (with a $4 admission charge).

For more information, contact A.T.S. Multiplan-Easyscript Support Group, 7906 34th Ave. SW, Seattle, WA 98126.

Florida

The Tri-County Commodore User's Group may be contacted by writing to PO Box 1151, Ocala, FL 32678.

Stratford, CT

Commodore owners living in the Stratford, CT area are invited to join the Commodore User's Group of Stratford.

Meetings are held on the first and third Mondays of each month at 7:00 PM, in the Sterling House (on Main St. in Stratford). The group publishes a newsletter ten months out of the year and has special interest groups for both Basic and machine language.

For information, write The Commodore User's Group of Stratford, PO Box 1213, Stratford, CT 06497 or call Dan Kern-Elkins at 203-377-8373.

Ontario, Canada

Bruce C-64 User's Group is based in Port Elgin, Ontario and has approximately 85 members. Anyone interested in this group may contact David Munshaw, RR #4, Paisley, Ontario, Canada N0G 2N0.

Ft. Smith, Arkansas

Anyone living in the western Arkansas or eastern Oklahoma area may join the Commodore Computer Club of Ft. Smith.

The group offers access to its public domain library, a monthly newsletter and general sharing of knowledge. Meetings are held on the second Tuesday of each month in Ft. Smith.

For more information, write Commodore Computer Club of Ft. Smith, PO Box 6000 So. Station, Ft. Smith, AR 72906.

South Carolina

Drawing membership mostly from upstate South Carolina, the Spartanburg Commodore User's Group (SPARCUG) is made up of more than 100 families.

The group publishes a monthly newsletter, called Sparkplug, which is distributed across upstate South Carolina and contains brief releases about new products available for the Commodore systems, as well as advertisements for computer-related products.

For more details, write SPARCUG Secretary, Spartanburg Commodore User's Group, PO Box 319, Spartanburg, SC 29304.

Georgia

The Clayton County C-64 User's Group may be contacted through Joyce Jay, 527 Wavelyn Way, Riverdale, GA 30274.

Lansing, MI

The Lansing Area Commodore Club, which has been in existence for more than a year and a half, now has over 240 members.

Meetings are held on the second Thursday of each month, beginning at 7:00 PM, in the All Saints Episcopal Church (in East Lansing).

For more information, write Lansing Area Commodore Club, PO Box 1065, E. Lansing, MI 48823–1065 or call Jae Walker, 517-351-7061.

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Voice Master

This C-64 Synthesizer Lets You Record Your Own Voice

Voice synthesizers for your Commodore 64 aren't exactly new items, but the Covox Voice Master is something truly different. Unlike other speech synthesis units, which have either allophones or phonemes encoded on a ROM chip inside the unit, the Voice Master doesn't rely on preprogrammed parts of speech. Instead, it digitally records *your own voice*, stores it inside the computer's memory or on disk, and then reassembles the digitized information into sound again for playback.

One of the unique features of the Covox (cochlear voicing extractor) Voice Master is that it is used only for recording; once the sound source has been digitized and stored in memory, the unit is no longer required for playback. This is an impressive feature, since it allows you to encode your own libraries of words and phrases on disk and give copies to friends, who will be able to enjoy your work without the use of a Voice Master. Of course, they won't be able to reciprocate unless they also have a Voice Master.

Word/phrase libraries can be incorporated into your own programs, whether recreational or utility, and the results are simply amazing. Not only will your computer talk to you, it will speak in your own voice (or anyone else's that you record).

The unit comes complete with a high-quality, dynamic microphone, the program disk, the digitizer unit and a thorough and easy-to-understand user's manual. Hookup is a breeze: Plug the Voice Master module into the C-64's user port, plug in the microphone, boot the disk, and it's ready for use. To determine the proper recording volume, a red LED indicator on the Voice Master unit comes on when peak gain has been reached, and then flickers to indicate sufficient volume.

On the disk are several programs, including a demonstration of the unit's capabilities, a talking calculator and a talking clock. Other programs allow you to tailor the filtering, level and access of the speech vocabularies and routines.

The quality of sound recorded with the Voice Master is excellent. After experimenting for a short time to determine proper microphone placement and volume, I recorded a few phrases using my dog's name. Then I ran a short program calling these phrases out of memory. The dog responded just as though the voice were my own. Human ears will also have a hard time telling whether it's live or Covox. *(Covox, Inc., 675–D Conger St., Eugene, OR 94702. $89.95.)*

Tom Benford
Osborneville, NJ

Cardprinter LQ/2

Professional, Letter-Quality Printouts for C-64 and VIC-20 Users

As anyone who has tried to get a printer working with the C-64 or VIC-20 can tell you, it's not an easy (or inexpensive) task unless you're using a Commodore printer. But now Cardco has decided to make life easier for Commodore owners. Their new printers, the Cardprinter LQ/1, 2 and 3, are letter-quality printers designed to work with the Commodore computers. The LQ/2 retails for $350.

A Compact Unit

The LQ/2 is a nicely compact unit (11.7″ × 2.5″ × 7.8″). It prints at 12 cps, 12 cpi bi-directionally with logic-seeking. Because it weighs only 6.6 lbs., it would be easy to take on the road. The unit prints up to 80 characters per line and uses 8½″ × 11″ paper. Because it uses friction feed, each sheet must be inserted individually. There is no tractor feed option available.

The best thing about the LQ/2 is that it understands the Commodore computers. Geting it to work is a breeze. The serial cable plugs into the back of the Commodore (or the disk drive, if you use one). A thin wire attached to a connector plugs into the user port on the back of the Commodore. That's it—no cables to make or buy!

Software Compatibility

Of course, if a printer doesn't work with off-the-shelf software, it isn't much good. Cardco's cartridge-based word processor, called Write Now!, works fine with the LQ/2, as you would expect.

I also tested the printer with two other word processors: Homeword, from Sierra, and Quick Brown Fox. The Quick Brown Fox word processor asks a group of questions before printing a file. After answering "yes" to the Commodore ? prompt, the printout was perfect.

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Also, in March, "Hi Res Painter" will let the artist in you create a masterpiece on your VIC screen. Plus, March **ReRUN** offers challenging, fun-filled games like "Quatro" and "Fly The Grand Canyon".

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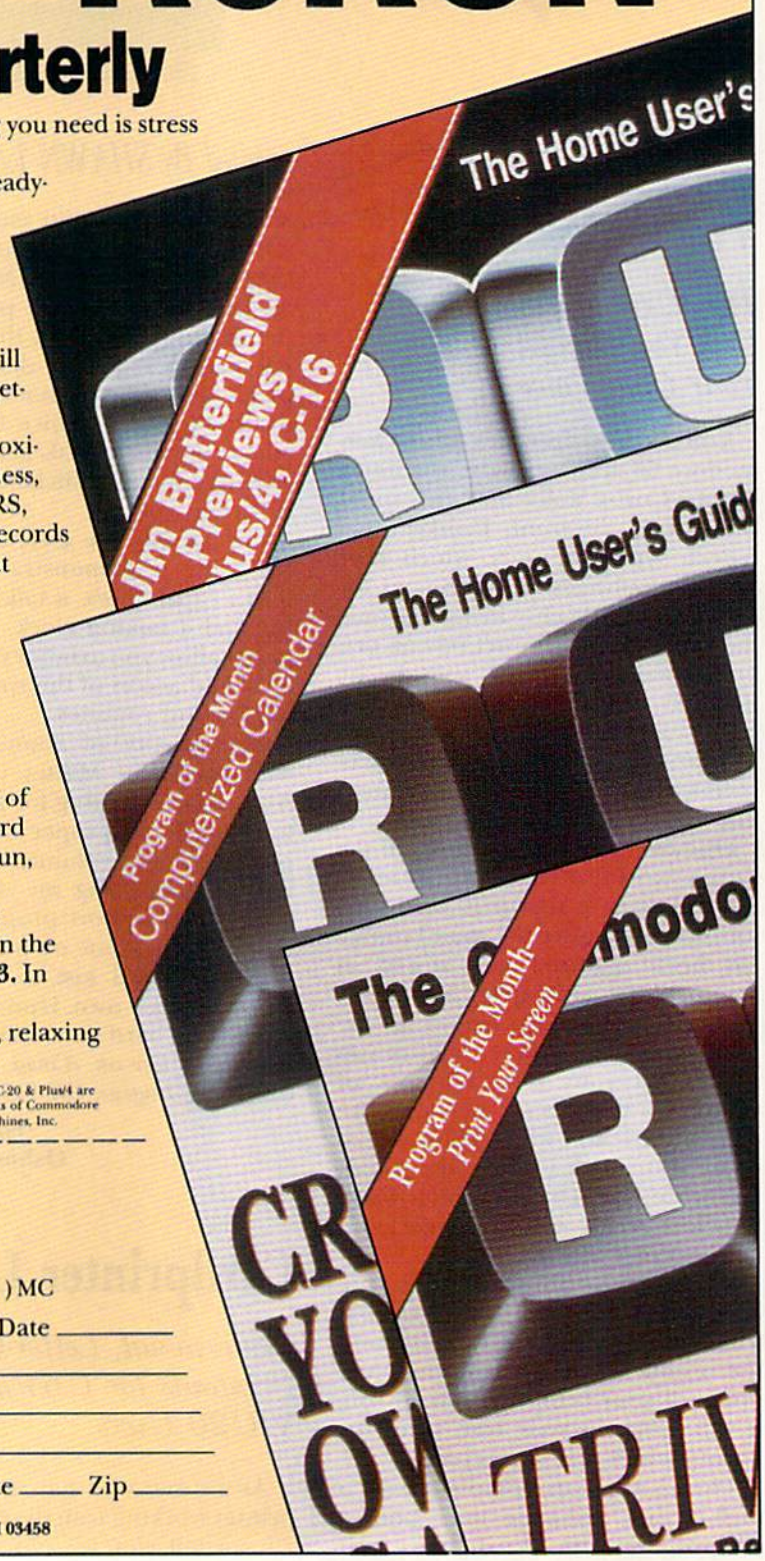

* Plus/4 programs are contained on the C-64 loader.
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The first attempt I made to print a few paragraphs using Homeword wasn't entirely successful. There were no capital letters, despite my having used them in the file. After a perusal of the software manual, I discovered that I needed to change the secondary address. After doing so, the printout was fine.

Program Printouts

Printing out a Commodore Basic program is a bit more involved. After loading the program to be listed, some commands have to be executed directly. The following short statements got my program to the printer.

```
OPEN 4,4,3
PRINT#4:CMD4
```

I was surprised at the finished product. LQ/2 reacts very much like the Commodore printers, but the quality of the print is much better. It would be difficult to tell whether the printout was done with a printer or a typewriter.

Not Quite Perfect

There are a few limitations that need to be pointed out, however. The print speed is snail-slow compared to a dot-matrix printer. Because the printer has no tractor feed option, each sheet must be inserted individually, and this means the working printer needs constant attention. Printing an eight-page paper can take half an hour. Listing a program must be done in sections. Also, there is no easy way to change the print mechanism, as is the case with a daisy wheel printer.

Summary

For the student or small-businessman who needs letter-quality print, the Cardprinter LQ/2 is an excellent buy. With a minimum of effort on your part, this printer will be putting out letters and drafts as nicely as any secretary can. It works with some of the most popular word processing programs available at this time.

For the programmer, the graphics translations will be helpful and the printouts are easy to read. The time involved in printing isn't too excessive, considering the price of the LQ/2.

An additional feature of the unit is the parallel port. A standard Centronics cable will allow most computers to work with the LQ/2. So, if you have two computers, or if you're planning to buy another one, there is a good chance that the LQ/2 will work with both. *(Cardco, Inc., 300 S. Topeka, Wichita, KS 67202. $349.95.)*

Cheryl Peterson
Miami Beach, FL

Screenmaker 80-Column Video Board

Give Your Commodore A High-Quality, 80-Column Display

Screenmaker is an 80-column video board for the Commodore 64, from CGRS Microtech. In conjunction with a suitable monitor, it provides an industry-standard, 80-column × 25-line monochrome video display, greatly improving the operation of word processors, spreadsheets and other similar programs. It is a useful and well designed product from one of the oldest manufacturers of Commodore accessories.

Screenmaker consists of a small cartridge for the expansion port, a disk containing programs to initialize and test the cartridge and an instruction manual. The cartridge contains 14 IC chips mounted on a printed circuit board and connects to any compatible monitor through an RCA-type connector. It is powered directly from the expansion port, requiring none of the extra wires or connections so often found in C-64 add-ons. No tools are required for installation.

To operate in 80-column mode, you connect a monitor to the cartridge's output jack, then load and run the initialization program, which can afterwards be set aside. If all goes well, a very clear and distinct 80-column video display will immediately appear on the screen. The Screenmaker's 8 × 8 dot characters are sharp and well defined—markedly superior to those generated by the C-64 itself.

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One example is the graphics circle produced by shifting the w key. On the C-64, this character is a plump doughnut with a tiny hole. The Screenmaker version of this character is a perfectly formed, well defined circle. The difference is striking. Another comparison is that of the shifted asterisk and shifted-c graphics characters. These are supposed to be discrete, horizontal lines, positioned $^4/_8$ and $^5/_8$ of the way up from the baseline. On the C-64, even with a monitor of the highest resolution, the two characters are indistinguishable; with Screenmaker, they can be differentiated with ease.

Screenmaker produces every one of the 368 Commodore characters, using standard C-64 character codes. It is completely compatible with the Basic Print statement and with machine language programs that use the Kernal routines.

Quantity purchasers can get special character sets for the Screenmaker, and skillful programmers can do wonderful things with the display, regardless of the character set. It is possible, in conjuction with software, to have variable characters per line, variable lines per screen, and so forth.

Screenmaker's 80-column video RAM is contained in on-board chips, and appears at $9800–$9FCF. In case of memory conflict, a few simple Pokes can relocate it to $B800–$BFCF. An auxiliary input jack pipes the C-64's 40-column color video signal into the Screenmaker; under software control, this signal, rather than the 80-column signal, can be transmitted to the monitor.

As with many computer products, the user's manual for Screenmaker leaves something to be desired. It gives enough information to get you up and running, but that's about it, unless you're an expert computerist. (For those experts, there's a memory map and some sample machine language code for doing wonderful and exotic things.) Microtech states that a revision of the manual will be forthcoming; if it's up to their usual standards, it will be a big improvement.

Having a suitable video display is a prerequisite to satisfactory 80-column computing. A TV set *won't* work with Screenmaker, or with any other 80-column board. The bandwidth required for 80-column text is simply too wide for a color set to handle. You might have some limited success with an RF modulator and a black and white set. If you want to have an 80-column display, you really need a monochrome monitor with a video bandwidth of 16 mhz or more.

Screenmaker is a superior product in every respect, especially the quality of display. It is simple to use and has all the features you'd want in an 80-column accessory. It can be used with Microtech's Copy-Writer word processing software, which comes in a special 80-column version. I hope to enjoy many years of pleasure and service from both. *(CGRS Microtech, PO Box 102, Langhorne, PA 19047. $169; $199 with Copy-Writer.)*

Louis F. Sander
Pittsburgh, PA

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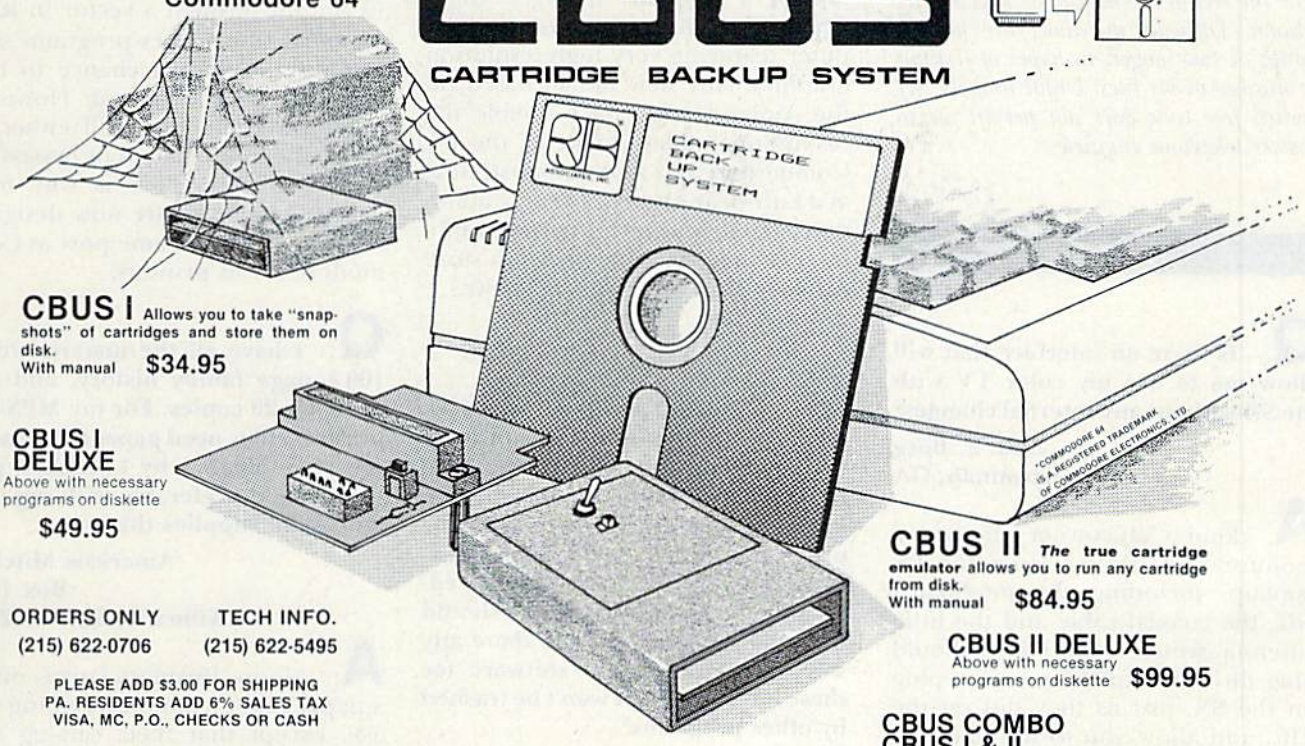

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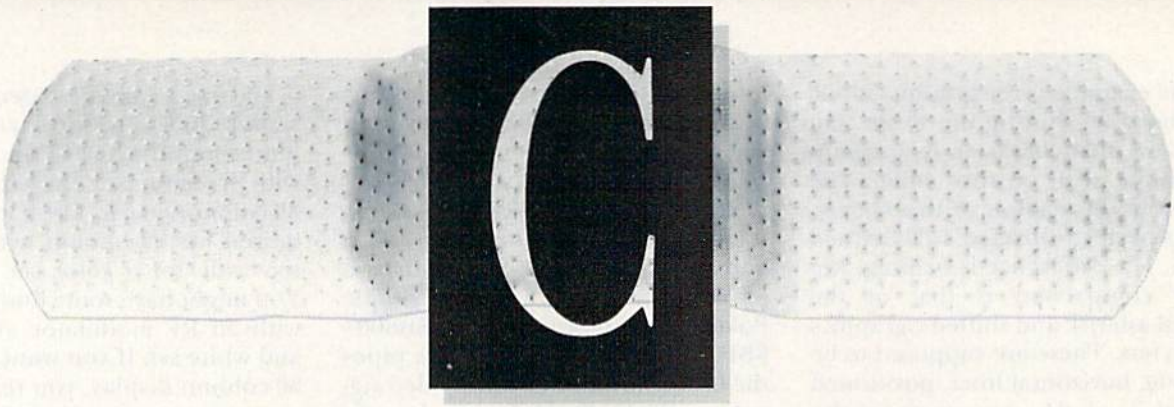

JIM STRASMA

Commodore Clinic is a monthly column designed to help you through any troubles and questions you have as you use your Commodore computer. Send questions to:

Jim Strasma
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So this column can help as many people as possible, please try to limit yourself to one brief question of widespread interest a month. If you include a full-sized (#10) self-addressed stamped envelope, I will try to reply even if your letter is not published. If your question is urgent, please mark it so. Otherwise, I answer most questions near the end of the month, as I write this column. Difficult questions are kept a month or two longer, in hopes of finding an answer in my files. Unfortunately, my limited free time does not permit me to answer telephone inquiries.

Hardware

Q: Is there an interface that will allow me to use my color TV with the SX without any internal changes?

Mrs. E. Borg
Savannah, GA

A: Find a VIC owner who uses a monitor, and ask to borrow the TV hookup, including the modulator box, the coaxial cable and the little antenna switch box. These should plug directly into the monitor plug on the SX, just as they did on the VIC, and allow you to use your SX with a TV. Unfortunately, I haven't an SX on which to test this, but I'm told it will work.

Q: What I need is high resolution for display purposes. I have 65,000 designs I wish to convert and display. Could a higher degree of resolution be achieved on a VIC (with added RAM), or should I go to a 64 for display?

Ken Lansing
Sierra Vista, AZ

A: The 64 has 64,000 pixel resolution, better than the VIC's 32,384 pixels, but not quite the 65,000 you requested. This might be a good time to wait; last summer, Commodore bought a company (Amiga) whose primary product was a home computer featuring very high-resolution graphics. Any new model based on the Amiga should have double the resolution enhancement of the 64. Commodore has also demonstrated, at a European show last year, a multiuser system with even better graphics. Let's see what they have in store for us at this year's spring shows.

Q: Why do printer interfaces that tap into the user port not work with programs that contain machine language? I bought a cable by Mikrotek that works fine on most Basic programs and is a great help in listings. But it won't work with Speedscript or Practicalc. Why should there be any problems? Is there any way of relocating the software for these interfaces so it won't be trashed by other programs?

J.G. Frajkor
Ottawa, Ontario
Canada

A: There are at least two reasons such interfaces may fail to work with some programs. One you've noted—a conflict in the use of the memory the interface software requires. Yes, a skilled machine language programmer can relocate the interface program. However, no matter where it is moved, some programs will still conflict with it, because there is no part of the 64's memory that is never used by any program but still usable by yours.

The other reason for the failures you've noted is that the Print routine used by the 64 is located in unchangeable ROM memory. It sends its output through a vector in RAM memory, which gives programs such as your interface a chance to trap and redirect the output. However, other programs may still either redirect the output again or bypass the vector entirely. That is why most printer interfaces are now designed to connect to the same port as Commodore's own printers.

Q: I have all the material for a 100+-page family history, and will print 15–20 copies. For my MPS-801 printer, I now need paper that is acid-free, fan-fold, 9½ by 11 inches, perforated and preferably with rag content. Who supplies this?

Americus Mitchell
Box 1335
Kilmarnock, VA 22482

A: Moore Business Forms offers a paper that includes everything you ask, except that their catalog says nothing about acid content. The catalog number for this paper is K13151, and you could ask about the

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paper's acid content by phoning them at 800-323-6230. I've also included your address so other readers who know where to buy suitable paper can contact you.

Q: My 1541 disk drive will not read or write the first track on any disk. I would appreciate any comments as to remedies.

Randy Wombacher
Taylorville, IL

A: It sounds like your track-one bumper is improperly set. Any dealer that does repairs should be able to fix it for a small fee. It's just a matter of moving a bit of metal that's held by a screw.

As long as you'll be at the dealer's shop anyway, you may want to consider replacing the original stop with Quiet Drive, a spring from Cardinal Software (13646 Jefferson Davis Highway, Woodbridge, VA) that appears to permanently solve the problem of drives being forced out of alignment because of being thumped against the stop when some copy-protected programs load. To use it, you may also need Cardinal Software's program, 1541 Physical Exam, which tells you when the stop is properly set, and also whether the drive is properly aligned, speed properly set and that the belt is in good condition. The program was a hit at both my Lincoln College Commodore camp and the MARCA Commodore fair in Hershey, PA, last summer.

Q: I have been using my drive for over a year without problems, but a couple of days ago I could not load any commercial programs or programs of my own. Today I was surprised to see my drive unlock and format a disk. It then was able to load any of my programs, although the drive is a bit noisier now. Any advice you can give me will be greatly appreciated.

John Hom
Cerritos, CA

A: Two possible causes immediately come to mind. The simplest would be that your disk drive's head might have gotten off-track, possibly as a result of loading one of the new commercial programs that move the drive head to abnormal positions. Either sending the New or Initialize commands to your disk will normally restore the head to normal operation after such a problem.

The other possibility is that your drive is going out of alignment. The program, 1541 Physical Exam, mentioned above, can tell you whether this is occurring. If so, have the drive aligned before you use it to write any more data or programs to disk.

Q: Are you aware of any plans for a hard disk for the 64? What about DOS for such a system?

Gay Steinberg
Lincoln Center, ME

A: The only hard disks I've actually seen for the 64 are Commodore's discontinued D9060 and D9090 disks, which can be connected to the 64 via an IEEE-488 interface. They are completely command-compatible with other Commodore disks, but overall compatibility depends on the interface, too. The problem with a hard drive connecting to the 64 directly, without an interface, involves the serial bus. Even with an IEEE-488 interface, the disk spends most of its time waiting on the bus; on the serial bus, that waiting time would multiply to a point that would render the disk useless. Before we see a truly usable hard disk for Commodore computers, we'll have to see a faster disk interface. On the other hand, a non-Commodore hard disk for the 64 was shown last fall at a computer show in England. With luck, we might eventually hear more about it.

Q: To use the printer or disk drive, they must be plugged into the computer. When I want to go from

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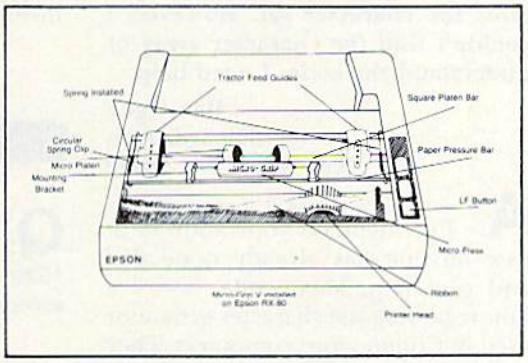

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one to the other, I have to plug and unplug the respective cables. Is there a device that permits both the disk drive and the printer to be plugged in simultaneously?

Dwane Howard
San Francisco, CA

A: No added equipment is needed to connect both a disk drive and a printer at once. Look on the back of your disk drive and you'll find two serial bus connectors. They are provided for just the reason you suggest—so more than one device can be connected at once. Connect your disk drive to the computer, and then connect your printer cable to the spare serial bus connector on the back of the disk drive. Since the disk and printer have different device numbers, they can share the same bus, and both will work just as they did when plugged in alone.

Q: **I would like to replace my 801 printer's character set. I checked and found a 2732 EPROM in it that contains the character set. However, I couldn't find the character array or understand the code. I need help.**

Ilan Ogen
850 3rd. Ave.
New York, NY 10022

A: I've included your address in case anyone has already done this and can help. Meanwhile, here's a hint regarding the character generator used in Commodore computers. They use an 8×8 dot matrix. Since the character generator is an 8-bit device (as is your 2732 EPROM), it takes eight bytes of memory to hold one character, with each byte representing one row of the final character. The first byte is the top row of the character, and the last byte is its bottom row. Within the bytes, each bit position represents one column, with bit 7 representing the left-most column and bit 0 representing the right-most column. If you have used programmable characters on a VIC or 64, you know how this works. With luck, you may find the same scheme inside the printer. Happy hunting!

Software

Q: **Is there any way to get the 1520 printer/plotter to dump hi-res screens? Surely, there must be a way!**

Warren W. McCurdy
U.S. Embassy/Vienna, Austria
APO, New York 09108

A: The only hi-res dump I've seen for the 1520 is the one included in the new version 4.0 of the Flexidraw light-pen drawing program, from Inkwell Systems, San Diego, CA. I've also included your full address so any 1520 user or vendor with another solution can contact you.

Q: **It seems that there are many publications dedicated to different**

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Trademarks: Lotus 1-2-3/Lotus Development. Commodore 64/Commodore Electronics Ltd. Multiplan/Microsoft.

Actual screen dump taken by VIZASTAR

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spreadsheet programs. Yet I have been unable to find a book that will cover Handic Software's Calc Result. Is there such a publication?

Sergio P. Davila
Puerto Real, Puerto Rico

A: I am aware of one such book, *The Power of Calc Result*, by Robert E. Williams. It is a Spectrum book from Prentice-Hall. Any bookstore can order it for you. The same author and publisher also offer *The Power of Multiplan*, but I have not seen independently published books about the other popular spreadsheets for Commodore computers.

Q: **Are there any maps published for the 64's ROMs?**

Drew Jenkins
Tusanawas, OH

A: I have reviewed two books that should meet your need. *Mapping the 64*, by Sheldon Leemon, is a Compute! book. It describes each major entry point into the 64's ROMs in a paragraph or more, giving full details of use. *Anatomy of the Commodore 64*, from Abacus Software, is a disassembly. It shows the actual machine language instructions used in the ROMs, with brief added comments as appropriate.

Another "unassembled" pseudo-source code for the 64 is available from Schnedler Systems (1501 N. Ivanhoe, Arlington, VA). It costs more than the Abacus book, but appears to offer some useful added features in return, although I have only seen brief excerpts from it.

Programming

Q: **In many of the program listings in *RUN*, there are two characters that I cannot locate on my 64's keyboard. The characters are the left and right braces. Would you please mail me some information on how I can locate this symbol on my keyboard?**

Thomas Skeen
S. Lake Tahoe, CA

A: Not without a stamped reply envelope, sorry. But here's the answer. The braces, { and }, are not on Commodore keyboards. That's one reason they are used in *RUN*'s program listings—they mark off things you *don't* type in as printed. When you see them, notice the words between the braces. Instead of the braces, press the key named between them. Thus, if you see

```
10 PRINT "{CLR}"
```

do not type either the {, the } or what is between them. Rather, when you reach that spot in the line, press the key labled CLR. Since it is printed on the upper half of its keytop, you'll also need to hold down the shift key as you press it. If your computer is in Graphics mode, as it is when first turned on, the result will look like a heart within a box.

Many printers are not able to properly print the braces, but if yours can, you can print out both the left and right braces as follows:

```
10 OPEN 4,4
20 PRINT#4,CHR$(123):REM ASCII LEFT
   BRACE CHARACTER
30 PRINT#4,CHR$(125):REM ASCII RIGHT
   BRACE CHARACTER
40 CLOSE 4
```

Q: **I tried to dump a run of the enclosed program to paper, using the method you suggested in the September 1984 issue of *RUN* (OPEN 4,4:CMD 4:GOTO 100), but I cannot get it to work. What am I doing wrong?**

G. Krumnacher
Charlottesville, VA

A: I normally can't debug programs for readers, but in this case the problem was instantly obvious. Your program includes a Get statement, one of whose lesser-known effects is to turn off any current CMD command and halt dumps to a printer. To solve the problem, replace all lines such as this:

```
115 GET A$:IF A$="" THEN 115
```

with an Input statement:

```
115 INPUT A$
```

Q: **I am writing a program and I use the Get command to get a character. Then I need to Poke the character into a screen location. However, when I do, I end up Poking the character code rather than the screen code. How do I solve this?**

Mark Shaw
Joliet, IL

A: Here's a short program for the 64 to do the conversion and the Poke.

```
10 S=1024:REM START OF SCREEN
20 GET G$:IF G$="" THEN 20
30 G=ASC(G$)
40 B=G AND 128
50 G=G AND 63
60 IF B THEN G=G OR 64
70 POKE S,G
80 S=S+1
90 IF S<2025 THEN 20:REM FULL?
99 END
```

If you have a VIC or Plus/4, just change the screen addresses in lines 10 and 90 to match your system.

Q: **As an owner of a gas station, I've been unsuccessful in finding an Accounts Receivable program for the 64 that will accept and compute the price per gallon on my statements. Is there any program that will input the correct price (e.g., $1.209) without dropping the nine-tenths of a cent?**

C.L. Nagel
8145 Timber Lane
St. Germain, WI 54558

A: I haven't heard of one, but if there is, you should hear from its authors now. Actually, many A/R programs calculate everything in whole cents, and could be modified to compute everything in whole tenths of cents instead, at the cost of reducing the maximum size of business they can handle. Fixing one for your needs might be as simple as modifying the routines that insert the decimal points on input and when printing. However, finding an accounts receivable program that allows user changes may be difficult. One I'm sure can be altered is Barbara Prouty's excellent public domain accounting package, EZ Books 64, available from the Computoy Cult User's Group (PO Box 7776, San Diego, CA 92107).

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Q: Lately I have noticed ads for disk backup programs that claim to completely back up a disk in about seven minutes, using a single 1541. I have never been able to read or write disk files faster than 21K bytes per minute, consistent with the usual 15–20 minute backup speed. Thus, this new breed of copy program appears to work in an entirely different way, and I would certainly like to know the technique.

Steven Schnedler
Arlington, VA

A: Most such programs are based on 4-Minute Copy, a program that has circulated widely among user's groups. As the name suggests, it will back up a full disk in under four minutes.

For a long time its author was unknown, and the program was presumed to be in the public domain. However, this was not the case. It was written by Thomas Tempelmann, of Ernst-Ludwig-Kirchner-Str. 25, 2900 Oldenburg, West Germany, and is a commercial program there. Those who are using it and finding it helpful should provide the author with a suitable donation.

He has reportedly sold fewer than 80 of the 10,000 or more copies of his program now in circulation, making it the largest case of unintentional piracy since the first version of Space Invaders for the PET was circulated by user's groups here the same way several years ago.

As for how 4-Minute Copy works, the method is simple enough to describe. Tempelmann reportedly redefined two more of the wires on the serial bus as data lines, thus reading and writing three bits at once instead of the usual one at a time. The only disadvantage is that printers, interfaces, other disk units and any other devices on the serial bus must be turned off (or even disconnected) before using it, as the redefined wires were needed to direct traffic among several devices.

Q: Is there any way to get a directory of the programs that are on a cassette? Can I use the Disk command and change the 8s to 1s?

Tim Winn
Spring, TX

A: To see a list of the programs that are on a cassette, type VERIFY "Q" alone on a blank line, and press the return key. (If you have a program named "Q" in your collection, change "Q" to an unused name.) As each program name is found by the cassette, it will be displayed, until either the tape runs out or an end-of-tape signal is encountered.

Unfortunately, the disk directory command, LOAD"$",8, can't be altered to work on the cassette. This is because there is no directory as such on a cassette to be loaded.

Q: How can I make my printer print what I type onto the screen?

Raymond Kirlin
Seattle, WA

A: Here is a simple routine to make your computer plus printer act like a typewriter and send everything you type to both your printer and the screen. To quit, press the @ key.

```
10 OPEN 4,4
20 GET A$:IF A$="" THEN 20
30 IF A$="@" THEN 70
40 PRINT#4,A$;
50 PRINT A$;
60 GOTO 20
70 CLOSE 4
80 END
```

Updates

Update: In the September 1984 issue of *RUN*, you responded that it was necessary to copy each disk entirely to change its ID number, and that utility programs that change the ID make only a cosmetic change. If the disk ID is located in every sector of the disk, why can it not be changed with a utility that allows access to any given byte of any sector?

Harold Rosenblum
N. Bellmore, NY

A: Several readers misread that reply and sent me programs that quickly and easily change the cosmetic disk ID number. But that's the problem, not the solution. Do *not* change the cosmetic ID when you can't change the sector IDs to match. Why can't you change the sector IDs? Because they aren't in the part of a sector you can get at with documented disk commands.

Although the chart on page 64 of your 1541 user's guide is inaccurate in other ways, it does illustrate this problem well. The 256 bytes of data that disk utilities can alter are the visible part of a sector. But they are not, by any means, its entire contents. The sector ID is elsewhere, in a relatively inaccessible header. To get at that and change it, you would need a whole new disk utility, and such utilities are just now beginning to be developed. For full safety, you must either restore the original disk ID or completely recopy the disk.

Update: Regarding your answer to Leo Esquenazi in the October 1984 issue, I had a similar symptom—that is, both lights on my 1541 disk drive suddenly going out, although the drive motor continues to run. The bridge rectifier supplying 5V had gone intermittent, not allowing the rectified current to pass through. (The drive motor is supplied by the 12-volt power supply.) I simply replaced the bridge rectifier with one from Radio Shack. I chose a 50 PIV, 25 amp one, which will carry any load.

I suspect the 5-volt rectifier is running near capacity. (It runs hotter than the 12-volt rectifier.) This may be why some fail.

Steven Walley
Sunnymead, CA

A: Your update came at a most opportune time—just after one of the 1541s at my college failed with the same symptom. Your cure worked perfectly; I replaced the rectifier with Radio Shack's part number 276-1146. It is only a 4-amp, 50 PIV unit, but is a pin-for-pin replacement, whereas your 25-amp unit (part number 276-1185) would have taken a bit of wiring. The needed rectifier is one of two located on the back row of components, near the right rear of the 1541's main circuit board, and looks like half of a domino. The 5-V rectifier is to the left of the 12-volt rectifier when viewed from the front of the drive. Some soldering is required to replace it. Thanks for the hint. R

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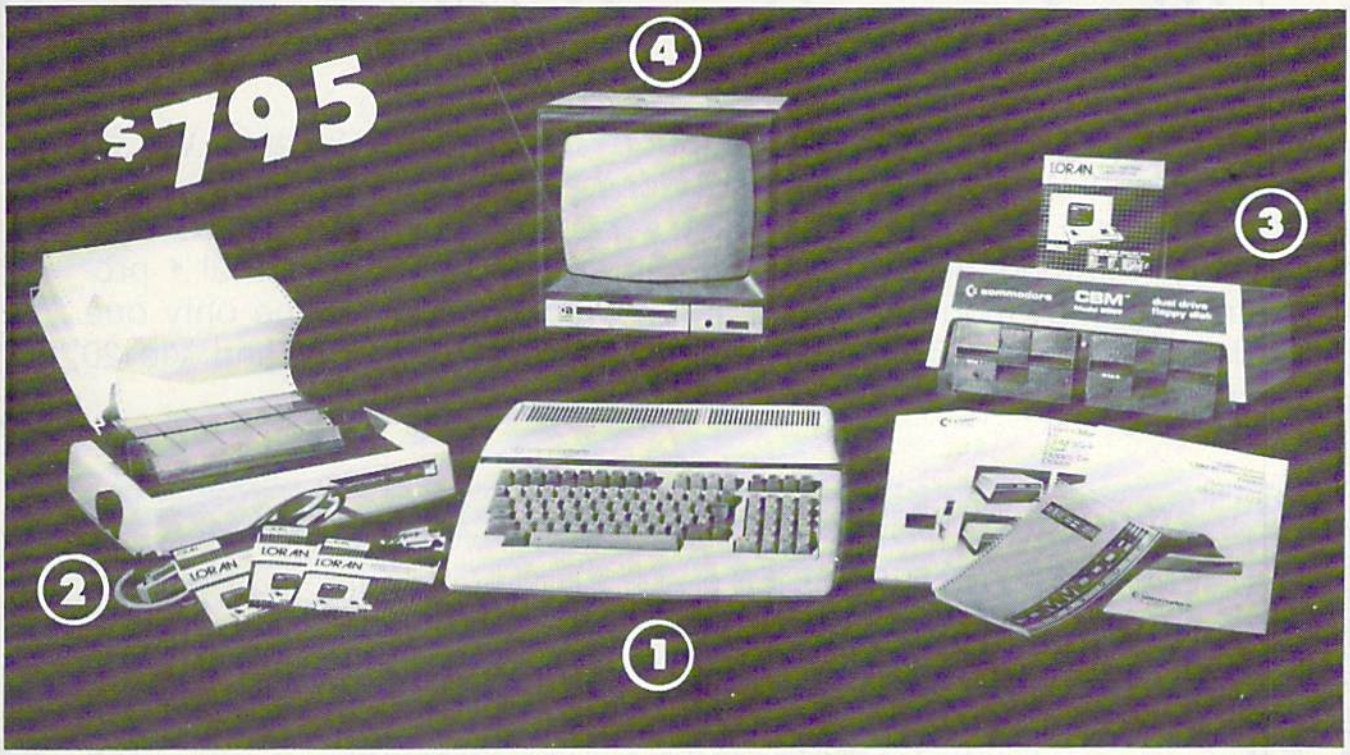

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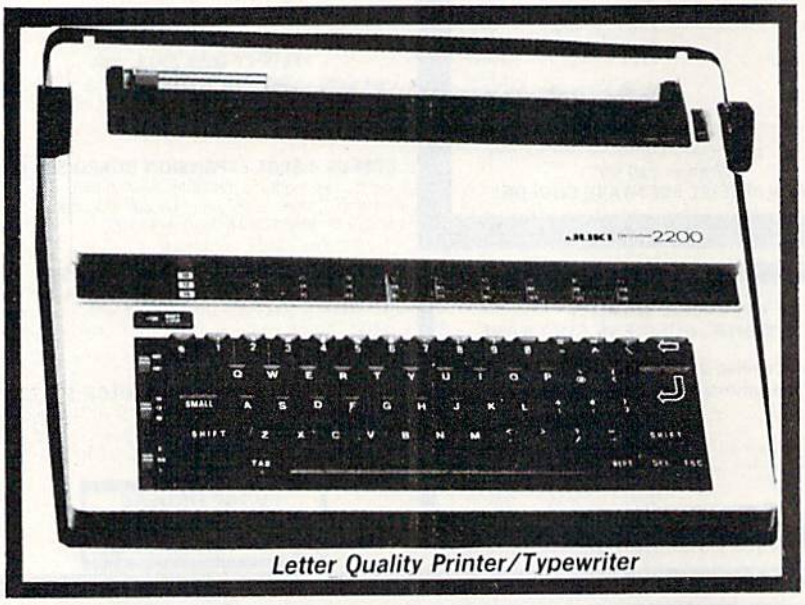

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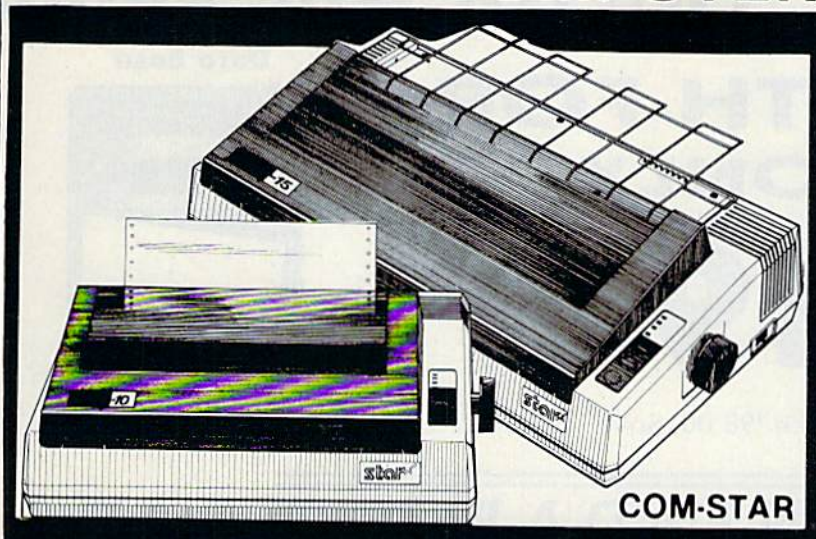

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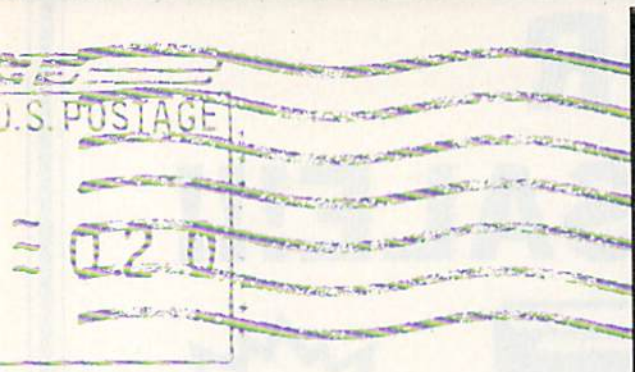

Hooked by Comal

I am 75 years old and am a subscriber to *RUN*.

After reading the Comal article by Colin Thompson (*RUN*, October 1984), I took it hook, line and sinker. After only a few nights, I was able to write a short program. I find the Comal language to be very exciting and have ordered a cartridge.

Glad to see you had the foresight to open the door to Comal in *RUN*.

Harold Thurlow
Hope, MI

Program Enhancement

W.G. Voight's "Post a Notice" (August 1984) was very good and gave me a lot of ideas for use.

As admitted by the author, this was not written for the Commodore 1526 printer. To utilize this program in the 1526, you must activate the printer's Format-control option.

You do this by opening a channel to the printer's secondary address. In this case, we use 6, which sets spacing between lines. After this, a CHR$ command is used to set the spaces; a value of 20 will eliminate the spaces between the lines. This now changes line 210 to read:

```
210 OPEN1,4:OPEN6,4,6:PRINT#6,
    CHR$(20)
```

and of course,

```
290 CLOSE 1:CLOSE 6
```

Arnold D. Schurr
Miami, FL

The Plus/4: Point/Counterpoint

Your article, "Meet the Plus/4 and C-16" (November 1984), by Tom Benford, has left me with the uneasy feeling that you have not been entirely frank with your readers in regard to the built-in software in the new Plus/4 computer. Having had an opportunity for a hands-on session with the machine, I have an entirely different view of the usefulness and ultimate value of the four programs.

First, the text memory will hold only 99 of the 77-character lines. When the lines are reduced to about 70 characters to allow margins, you can get about two pages in memory. For any documents beyond that, one would have to resort to linking files.

Second, text entry is as clumsy as any I've seen (and I've used over 20 word processors). With horizontal scrolling, you never can see an entire line. Thus, if you should lose the thread of thought or get into a syntax bind, you have to scroll back and forth to review your work.

Third, as if that weren't bad enough, there is no word-wrap feature, contrary to your statement in the article. Words are broken wherever they fall on the 77th column. The result, when combined with horizontal scrolling, is a nightmare when editing a completed manuscript. Each line has to be traced back and forth.

Fourth, there is no preprint formatted screen preview of text. Lacking this essential feature, there is no way to determine where page breaks will occur or how special formatting will look. With most formatting done with embedded characters, the user will find himself printing a document several times to make sure that its appearance is up to standard.

My concern over your lack of hard-nosed criticism of this software is derived from the fact that I regard the concept behind the Plus/4 a giant step toward a truly mass-market computer. Why Commodore elected to insert such limited software in an otherwise excellent machine, I have no idea.

Charles M. Proctor, Jr.
Silver Spring, MD

Thank you for your comments. We will help to explain the reasons why Commodore has chosen to insert this word processor into the Plus/4 by responding to your four points of criticism.

First, yes, a document is limited to 99 lines. A two-page document is not out of line for home applications such as correspondence or educational purposes. In addition, a prime rule for business correspondence is to keep letters to one or two pages. Commodore has included a link-file feature for those occasions that necessitate larger documents. This is a feature commonly found in most home computer word processors.

Second, horizontal scrolling is not as unusual as you state. OmniWriter and Script 64, for the C-64, are just two examples of word processors that have this "clumsy" feature and have still received good reviews and sold well over the previous year.

Software producers have to design programs realistically in view of what the average consumer will be using in terms of hardware. Many home computer owners have a television rather than a high-resolution monitor, and, unfortunately, the 80-column display is often unreadable on a television. The scrolling 80-column display of the Plus/4 and other similar word processors is a realistic compromise for the home user.

Third, contrary to what you claim, the

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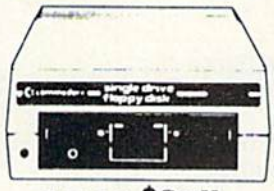

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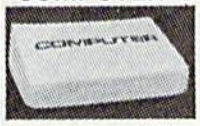

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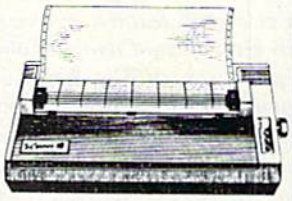

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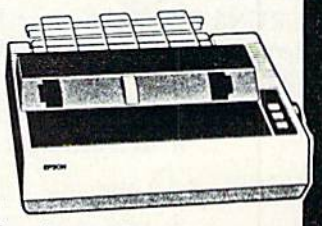

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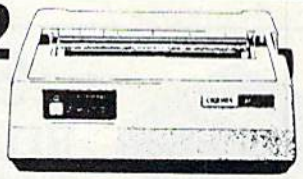

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Plus/4 does have a word-wrap feature. It is not active on screen, which is a negative point. It is active on printouts, however, which is a good feature. Again, you will see this kind of word wrap on other C-64 word processors, such as Script 64.

Fourth, a preprint formatted screen feature would be a nice addition to any word processor. The Plus/4 does not have this, and you will discover that many top-selling word processors also lack this feature.

People will have to evaluate the Plus/4 on the basis of its price ($300) and quality in comparison to other home computers on the market, such as Radio Shack, Apple, Atari and the C-64. If you want IBM software inside a 40-column display home computer, you won't find it in the Plus/4.

See RUN*'s December issue for the first in a series of in-depth reviews of the built-in software of the Plus/4.*

Margaret Morabito
***RUN* Technical Editor**

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DIRECTORY	@$
SELECTIVE DIRECTORY	@$: filename
ERASE DIRECTORY FROM DISK	@N : diskname
FORMAT DISK	@N : diskname, ID
INITIALIZE DISK DRIVE	@I
LOAD A BASIC PROGRAM	/filename
RENAME FILE	@R : newname = oldname
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SPEED CHANGE VIC-20 SPEED	@UI –
VALIDATE DISK	@V

Table 1. *VIC-20 wedge commands.*

VIC-20 Wedge Commands

I want to thank you for your article, "Mysteries of the Wedge Revealed," in your September 1984 issue.

I went right to work and tried all the commands with my VIC-20 wedge program. Below is a list of the ones that work (see Table 1). All the others resulted in a Syntax error.

James Lambert
Hastings, NE

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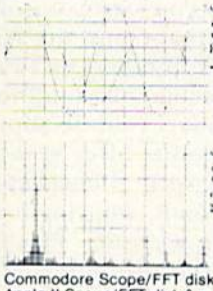

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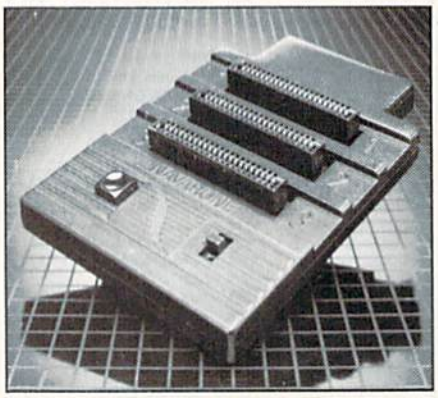

Three-Slot Expander

Navarone Industries, Inc. (510 Lawrence Expressway #800, Sunnyvale, CA 94086) has released The Cartridge Expander for the Commodore 64.

The Cartridge Expander is a three-slot expansion unit housed in a plastic shell. The unit plugs into the cartridge port of the C-64. Up to three cartridges can be plugged into the Expander and selected by a switch. The Expander also features a built-in reset switch. Retail price is $39.95.

Check Reader Service number 400.

High-Speed Storage System

The Quick Cassette is a small, high-speed, mass storage system for the C-64 and the VIC-20, designed as a replacement for audio cassette storage systems.

Miniature Microwafer storage cartridges are used in the Quick Cassette drive. The drive plugs into the cassette port on the Commodore. A proprietary operating system enables the Quick cassette to read data from the tape into the computer.

The Quick Cassette for the C-64 has a slow-speed Read mode that emulates an audio cassette, allowing you to boot the high-speed operating system from a special Microwafer to the computer. When the operating system is loaded, the Quick Cassette is completely compatible with Commodore Basic and audio cassette commands.

A connector on the drive allows you to copy programs from either a Commodore C2N audio cassette or another Quick Cassette drive. An LED indicator shows when the drive is in use. The Quick Cassette drive is available for under $85. Entrepo, Inc., 1294 Lawrence Station Road, Sunnyvale, CA 94086.

Check Reader Service number 404.

Ride the Rails to Riches

Rails West!, an educational game for the Commodore 64, returns you to the days of the developing railroad business. It attempts to reflect both the excitement and risk of those challenging times.

It is the late 19th century and you are involved in the growing railroad business. Should you start your own company, or perhaps buy the controlling interest in another? Be aware of the country's economic condition, as it will surely effect your decisions.

The action menus offer several business options, such as buying/selling stocks and bonds, applying for a loan and floating securities. Play options allow you to choose the scenario, number of players and level of play.

Rails West! is available on disk for $39.95. Strategic Simulations, Inc., 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043.

Check Reader Service number 405.

Aerial Combat

Mig Alley Ace is a simulation of head-to-head aerial combat during the Korean conflict of the 1950s.

The split-screen feature allows two players to fly their F-86 Sabrejets in battle against each other or cooperate to defend U.N. troops from MIG-15s. Loops, dives, rolls and other maneuvers are necessary to attack or escape from enemy aircraft.

Pilots must consider airspeed, turn rates, gravity and other factors in order to make proper flight judgments. Other aircraft can be seen from your cockpit window or tracked with onboard radar. If your plane is hit, it will spin out of control, giving you only a few seconds to either gain control or bail out.

Mig Alley Ace is available on disk or cassette for the C-64. Retail price is $34.95. MicroProse Software, 10616 Beaver Dam Road, Hunt Valley, MD 21030.

Check Reader Service number 401.

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Commodore or Vic Color Problems?
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You're not alone. Thousands of Commodore 64 owners have "fuzzy" color on their TVs. Most have interference lines crowding out their great graphics. Many have bought expensive monitors or new TVs, and often even that hasn't helped. But, most of us just lived with the problem. Now the engineers at Bytes & Pieces have four simple, inexpensive solutions.

If you have an "old 64" (with the 5 pin Monitor Din Plug), you've probably had color, resolution and interference problems. We can solve them!

The Interference Stopper... For Vic-20 and Commodore 64. A new kit that installs in minutes with two simple solder connections. Best results when combined with #2, 3, or 4 below. Absolutely stops 90% of the RF interference on your screen. **$15.95**

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The Monitor "Improver"... If you have a Commodore 1701 monitor, this cable (3 prong) gives you a picture you won't believe. Better than the cable Commodore built ... by a lot. Try it, you won't be disappointed. (Also hooks your "Old 64" to the 1702.) **$24.95**

Reset Switches

At last, the "needed" switch for all Vic-20's and Commodore 64's. Commodore left out something that's really important... a simple reset switch. How many times have you been programming and gotten "hung-up" in your software? The only way to get back in control is to turn off the computer and lose your program and everything you had entered so far. Well, the engineers at Bytes & Pieces have solved that one too... with your choice of 3 reset switches. They are time savers and guaranteed to return control to you every time. Of course, you're guaranteed to be satisfied.

Version 1—Install it Yourself. Now installing this does require you to open your computer, make two simple solder connections, and drill a small hole in the case (to mount the switch). Obviously, this connection will void your warranty, so don't proceed until your computer is out of warranty. But the day that happens, install the reset switch. A steal at **$9.95**

Version 2. A special **buffered** flow-thru version, that plugs into your serial port, but gives a "Y" connection that provides your computer with another serial port **and** the reset switch. The ultimate in versatility, convenience and simple installation. No soldering, of course. Introductory Priced at **$19.95**

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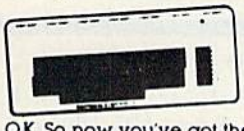

Because They're Better Blank

O.K. So now you've got the best computer in the world, and lots of complex software to run on it. One problem. Unless you work with some of these programs everyday or are a computer genius, who can keep all those commands straight? "F5" in one program means one thing, and "F5" in another program means something else. A few companies do offer a solution... a die cut "cheat" sheet that attaches to your keyboard with all the commands of one program printed on it. Great idea, unless you need them for 10 or 20 programs. You could purchase another disk drive for the same investment. Our solution? Simple. A pack of 12 lined cards, die cut to fit your keyboard and just waiting to be filled with those problem commands **you** forget most often. Simple? Yes, but effective. Now you can have **all** your program commands right at your finger tips on YOUR VERY OWN, custom designed "cheat" sheets. Order a couple packs today!

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Is Your Commodore Disk Drive Hot and Bothered?

Most of them are, you know. Commodore makes a great disk drive. Only trouble is, they suffer from read and write problems frequently. And almost always, it means a trip to the shop for a head alignment. Maybe you can afford to have your drive out of commission for a while. And to pay to have your drive repaired. But we've been told that most of these problems occur because the drive has overheated, throwing the head out of alignment because of parts expansion.

The engineers of Bytes & Pieces pondered this problem, and came up with a simple solution. An inexpensive muffin fan that sits on top of the disk drive and blows cooling air through it. No more hot and bothered drives. No more heat-caused read/write problems. A simple, inexpensive solution. And best of all, the fan will work on other computer items as well, as long as they have vent holes in the top. Just set the padded fan on top and your problems with overheating are over.

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Cheat Sheets		
	Sets of 12 Keyboard Cheat Sheets @ $15.95	$
	2 Packs (24 Sheets) @ $24.95	$
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Lode Runner Returns

Broderbund Software (17 Paul Drive, San Rafael, CA 94903) recently announced the release of Championship Lode Runner, a sequel to the original 150-level version introduced in 1983.

Championship Lode Runner has action similar to, but more difficult than, the original game. The player must move his treasure hunter across floors, through trap doors and up and down ladders, trying to pick up as much gold as he can. The hunter's sole defense from the guards is a laser gun, which he uses to blast holes and gain entry to gold chambers.

All levels of play in Championship Lode Runner are more difficult to master than even the most advanced level of the original. Also, the championship version does not have the game generator that allows you to construct your own screen.

Available on disk for the Commodore 64, Championship Lode Runner has a retail price of $34.95.

Check Reader Service number 402.

Predict the Weather

Forecast! is a home weather station for the C-64, recently released by CBS Software (One Fawcett Place, Greenwich, CT 06836). It is designed for ages 12 and up.

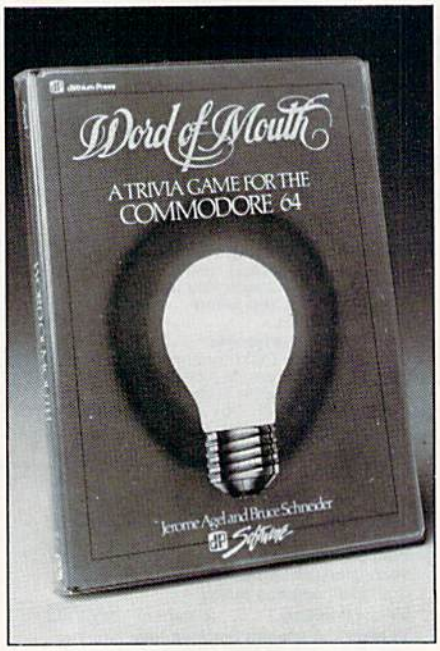
Created by meteorologists, the program attempts to help you understand the science of weather prediction and the causes and effects of weather. In exploring the interpretation of weather data, Forecast! aims to teach you the fundamentals of short-term prediction.

There are five sections in the program: Weather Forecast, Weather Calculator, Weather Keeper, Weather Traveller and Weather Tracker. The program guide explains the language of forecasting and contains resource materials for further study. Forecast! is available on disk for $49.95.

Check Reader Service number 403.

Trivial Test

Dilithium Press (8285 SW Nimbus, Suite 151, Beaverton, OR 97005) has announced the release of Word of Mouth, an electronic trivia game for the Commodore 64.



The game's goals are to test your knowledge of trivia and to encourage the sharing of knowledge among the players. There are more than 25 categories of questions from which to choose, including history, literature, sports, films, science and music. From these categories, the computer randomly chooses from over 1700 questions, and then records that question on disk, so that it will not be asked again until all the questions have been used.

A scoreboard keeps track of the action and an imbedded clock times the game. Play can be against the clock, for a certain number of rounds or to a preset score. There are five levels of difficulty and up to six players can participate. Designed for ages nine to adult, Word of Mouth is available on disk for $29.95.

Check Reader Service number 406.

Commodore-Compatible Printer

Inforunner Corp. (Airport Business Center, 431 North Oak St., Inglewood, CA 90302) has introduced the Riteman R 64 printer, which can be connected directly to the Commodore 64 through the serial port.

The Riteman, complete with a factory-installed Commodore interface (as well as its cables and connectors) has both parallel and serial face capacity. It can produce 120 characters per second in 9 × 9 dot-matrix print. The Riteman also offers a Reverse Field mode (producing white letters on a black background) and can produce true descenders, double-width characters and Commodore graphics characters.

The Riteman has a fully contained cartridge ribbon and a steel print head cable. It retails for $449.

Check Reader Service number 410.

Graphics Tablet

Animation Station is a touch-sensitive graphics tablet that serves as a graphics and text processor.

The tablet has a built-in character set, complete with several type fonts, allowing you to label presentations and reports. With the printer/dump feature, which supports many popular printers, you can make copies of whatever you draw on the screen.

Included with the package is Design-Lab, a color graphics program. The program's cut-and-paste feature allows you to electronically reposition elements on the screen. Additional programs are also available.

Animation Station is available for the Commodore 64. It retails for $79.95. Suncom, 260 Holbrook Drive, Wheeling, IL 60090.

Check Reader Service number 411.

Joke & Dagger

First Star Software, Inc. (18 East 41st St., New York, NY 10017) has released Mad Magazine's Official Spy vs. Spy for the Commodore 64.

Spy vs. Spy challenges you and your opponent to escape from an embassy. The game has split-screen features that allow both players to be active at the same time, as well as to observe any booby traps the other may be setting.

There are 36 three-dimensional rooms containing items that each spy needs to make his escape—a key, top-secret plans, traveling money, a passport and a briefcase. Players must collect all the necessary items while setting (and avoiding) traps. The solitaire version features five difficulty levels.

Spy vs. Spy is available on disk for $29.95.

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Computereyes

Computereyes, a video acquisition system, captures real-world images on the Commodore 64's high-resolution graphics display.

A slow-scan device that plugs into the computer's I/O port, Computereyes can connect to any standard video source. With software control, a black-and-white image can be acquired within six seconds, and a multi-scan mode provides gray-scale images. Images can be reproduced on a printout.

Software is provided with the system, including machine language image capture routines, image save-to-disk capability and image packing and unpacking routines (to save disk space and speed up loading and saving).

The complete Computereyes package consists of an interface module, software support on disk and an owner's manual. Retail price is $129.95. Digital Vision, Inc., 14 Oak St., Suite 2, Needham, MA 02192.

Check Reader Service number 407.

Transylvanian Adventure

Transylvania is a graphics adventure for the Commodore 64, from Penguin Software (830 4th Ave., PO Box 311, Geneva, IL 60134).

It is midnight in Transylvania and you are searching for the Princess Sabrina. You must put the clues together and find the princess by dawn, or she will die. Werewolves, vampires and other creatures stalk you as you search the castle and surrounding forest. Will you find her in time?

Transylvania is available on disk and retails for $34.95.

Check Reader Service number 409.

Parallel Printer Interface

Giga International Corp. (2044 Center Ave., Fort Lee, NJ 07024) has introduced UniprinT, a parallel printer interface for the C-64 and the VIC-20.

UniprinT interfaces your Commodore with any parallel printer (including daisywheel printers). The unit converts Commodore ASCII into Standard ASCII through its Translation mode. In the Transparent mode, it accesses your printer's special features, such as underlining, boldfacing and italics.

The interface enables most printers to emulate the VIC 1525 printer, and it allows dot-matrix printers with programmable graphics capabilities to print all the letters and graphics characters found in Commodore ASCII.

UniprinT is available for $99.

Check Reader Service number 417.

What Makes You Tick?

Human Edge Software Corp. (2445 Faber Place, Palo Alto, CA 94303) has released The Mind Prober for the Commodore 64.

The program asks you a series of questions about someone you know or someone you have just met. Based upon your answers, a printed report is generated, revealing the hidden motivations, strengths and weaknesses of the person who has been probed.

The report has sections about how that person copes with stress, attitudes toward work, attitudes toward sex, personal interests and a summary paragraph entitled "What makes this person tick."

The Mind Prober disk is packaged in a paperback book, entitled *Reading Others*. The complete package retails for $29.95.

Check Reader Service number 418.

Typing Tutorial

Arrays, Inc./Continental Software (11223 South Hindry Ave., Los Angeles, CA 90045) has released Learn to Type, for the Commodore 64.

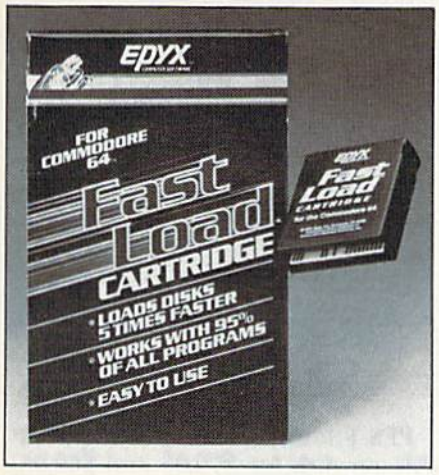
Designed for all ages, this program aims to familiarize you with the typewriter (and computer) keyboard, offering 25 basic lessons in key placement and finger control. Learn to Type covers the standard (QWERTY) keyboard, as well as the experimental Dvorak plan, which places the five vowels and the most commonly used consonants under your fingers.

The program provides a graphics display, showing which fingers to use for each key. To test your typing skills, a built-in game is included, as well as conventional speed and accuracy drills. For more practice in problem areas, Learn to Type allows you to create your own exercises. The program can record the progress of up to 30 users at one time. Retail price is $39.95.

Check Reader Service number 419.

Faster Driving

Epyx, Inc. (1043 Kiel Court, Sunnyvale, CA 94089) has released Fast Load, a new cartridge-based disk util-



ity for users of the Commodore 64 and the 1541 disk drive.

Fast Load plugs into the cartridge port of the C-64; no extra instructions are needed for operation. According to Epyx, Fast Load will work with roughly 95% of the C-64 software currently on the market, and it will enable you to load disks up to five times faster.

Check Reader Service number 412.

Taxes Made Easier

TaxVision, designed for the Commodore 64, is an income tax analysis and preparation package designed for use with Microsoft's Multiplan.

TaxVision provides an integrated set of templates, each representing a form that is approved by the IRS, that work with Multiplan in organizing your tax analysis. You need only fill in the form with your own information and data and the program will calculate and display the results of your entries.

You are required to enter data only once, as TaxVision automatically transfers all necessary information to other tax forms, and recalculates any new or last-minute entries of data. The program can also help you explore alternative tax options and can be modified to serve as a check register, family budget program or general ledger. Data can be entered and accumulated all year long.

TaxVision is designed for both personal and professional use. Retail price is $79. Vision Information Products, Inc., 5500 Atherton St., Suite 306, Long Beach, CA 90815.

Check Reader Service number 420.

Simplified Spreadsheet

Batteries Included (17875 Sky Park North, Suite P, Irvine, CA 92714) has released CalKit, a simplified spreadsheet package designed for home and small-business use.

CalKit provides more than 20 ready-to-use applications on one disk, including checkbook balancing, budget planning, income tax, balance sheet, net worth, metric conversion, home energy consumption and materials estimation for home improvements and repairs. Rows and columns needed for each application are predefined; calculations are done automatically.

The program uses a 99 row × 26 column format. It provides an on-screen help menu and constant prompting. Experienced users can design their own customized worksheets using the program's logical math functions.

CalKit is available on disk for the Commodore 64. Retail price is $49.95.

Check Reader Service number 416.

Learn Programming Through Graphics

Spellcaster, a graphics language for beginners, was recently released by Shenandoah Software (1111 Mt. Clinton Pike, Harrisonburg, VA 22801). It is primarily designed to introduce the art of programming.

This tutorial package aims to teach the beginner how to program graphics and video games. Spellcaster is composed of 32 primarily graphic (rather than numeric) basic operations. In this way, you can work directly with a pattern on the screen, rather than using numbers in machine memory, and you can watch the effect of your program as you write it.

Spellcaster contains control structures and offers simple support for multiprocessing. The on-screen tutorial provides numerous examples of concepts as they are introduced.

The complete Spellcaster package consists of the language interpreter and tutorial on disk, a manual and one issue of *Spellswapper* magazine (which contains a disk of Spellcaster programs and an extended tutorial). Designed for the Commodore 64, Spellcaster has a retail price of $39.95.

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New Products RUNdown

Personal Robot

Genesis Computer Corp. (1444 Linden St., PO Box 1143, Bethlehem, PA 18018) has released Nomad, a personal robot for the Commodore 64.

Nomad is an educational tool designed to teach programming logic. While learning how to control Nomad, the student learns the same kind of logic involved in writing computer programs.

Nomad has an aluminum chassis and a plastic body; a 25-foot cord and a power supply are also included. It is driven by precision stepper motors and can move forward, reverse, right and left. It has ultrasonic "eyesight" that allows it to detect objects in its path. The unit plugs into the RS-232 port, and it can be controlled with a joystick.

An optional Basic enhancement cartridge is also available, which adds Nomad commands directly to C-64 Basic. Nomad retails for $179.95. The Basic enhancement cartridge is available for $39.95.

Check Reader Service number 415.

Business Software

Software Publishing Corp. (1901 Landings Drive, Mountain View, CA 94043) has released C-64 versions of its PFS: File and PFS: Report business software programs.

PFS: File is a filing system that allows you to record, retrieve, update and review information. The program organizes information on forms that you design on the screen to meet your specific needs.

PFS: Report sorts, calculates, formats and prints summary tables from files created with PFS: File. It has sorting, automatic page numbering, title printing and centering capabilities.

PFS: File and PFS: Report are available on disk for $79.95 and $69.95, respectively.

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Fancy Footwork

Creative Software (230 East Caribbean Drive, Sunnyvale, CA 94089) has released Break Street, a break dancing game for the Commodore 64.

You'll do battle with the Stingrays, a neighborhood gang, and using either a joystick or the keyboard, you must try to outmaneuver your competition.

Each dance movement has a level of difficulty and you can try to perfect your footwork in dozens of break dancing moves. If you miss a key sequence, your dancer falls and the action is turned over to the Stingrays. Dance routines can be strung together, recorded and replayed.

Break Street is available on disk and retails for $24.95.

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Conquer the World

Global Conquest is a strategy game for the Commodore 64. It allows 2–6 players to compete in a winner-takes-all, worldwide conflict.

Players begin by placing their armies in strategic locations across the world, then waging war on neighboring countries. The game ends when one player has conquered all other armies and has gained control of the world. Sound, graphics and animation are used to enhance the action of the game.

Global Conquest is available on disk and cassette for $29.95. California Dreamers, PO Box 178, Seven Mile, OH 45062.

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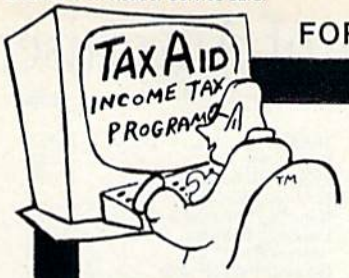

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March

COMING ATTRACTIONS

- **Shaping Up with Your C-64**—Jane Fonda, John Travolta and Raquel Welch all have their exercise programs—and so does Commodore. Now health-conscious computerists can use the C-64 to balance their diets and become more physically fit. *RUN*'s resident health expert takes a look at commercially available programs that will put you into the exercise mode.

- **The Business Angle**—*RUN*'s March issue will examine the serious side of computing with a look at how you can use your Commodore to manage home finances or run a small business out of your home. Articles will include:
  —Simplecalc 64. With this electronic spreadsheet program, you can do everything from balancing your checkbook to a complex investment analysis.
  —Landlord's Helper. If you rent property, this program will help you keep track of your real estate expenses and help you keep tabs on the performance of your invested dollars.
  —Money Manager. When it comes to loans and investments, this program turns your Commodore into a financial consultant.
  —Easy Invoices. Invoices are a critical part of almost every business; this program provides the answer to every businessperson's invoice-printing problems.

- **A Look at Monitors**—Are you monopolizing the family television with your computer hookup? The solution for family harmony may be the purchase of a monitor. This article will help you determine which monitor is right for you. A chart of the most popular monitors and their important features is also included.

- **Spotlight on Productivity**—This series on the built-in software for the Plus/4 continues with a look at File Manager, a database program that lets you create data files, which you can merge with the Plus/4's other built-in programs.

- **Renumberer**—This handy utility program will take the drudgery out of renumbering your program's lines.

- **Making Faces**—Youngsters will find this graphics game particularly enjoyable. This game takes the old Mr. Potato Head game one step further—users can animate their creations on the screen. For th VIC-20 and C-64.

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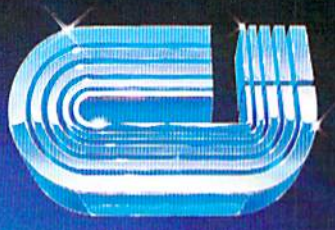
LQ/3 11" carriage, 13 CPS

"CARDPRINT" C/?+G PRINTER INTERFACE with Graphics
For printers that are not Commodore-ready, Cardco offers the C/?+G PRINTER INTERFACE including all cables and connectors for the following printers: all new Epson MX, RX and FX series, Star Gemini 10X and Delta 10, Prowriter, C.-Itoh 8510, NEC 8023, Okidata 82, 83, 84, 92, 93 and 94, Mannesman Tally Spirit and MT-160, Seikosha GX-100, BMC BX-80 and the Gorilla Banana. Prints the full Commodore character set; graphics, characters, reversed characters and reversed graphics characters.

"WRITE NOW" WORD PROCESSOR SOFTWARE
An excellent time saver, CARDCO OFFERS THE CØ2 "Write Now" program with built-in 80 column display. You see exactly what will print. All special codes can be transmitted to printers maintaining justification. Easy full-screen editing; works with any printer.

"MAIL NOW" MAILING LIST SOFTWARE
CARDCO D/Ø1 quickly (in memory) sorts by zip, category, name and state; fully compatible with "WRITE NOW". Other fine features include: User-oriented; menu-driven operation; each disk supports 600 entries. Format can print single, double or triple labels across.

All Cardco Products are available at your local dealers. Write for illustrated literature.



cardco, inc.

300 S. Topeka Wichita, Kansas 67202 (316) 267-6525

"The world's largest manufacturer of Commodore accessories."

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Circle 85 on Reader Service card.

LOOK WHAT'S ON TELEVISION TONIGHT.

6:00

THE HULK

The first comic attraction in the QUESTPROBE™ Adventure Series. You become a super hero. A joint (ad)venture of Scott Adams, Inc. and Marvel Comics Group. (Diskette)

6:30

MATH FACTS

(Ages 5 to 10) (Micro School) Educational TV Practice in basic math facts. Several levels (Easy to hard) (Diskette)

7:00

FRENZY/ FLIP FLOP

(Ages 6 to 14) (Milliken Edufun) FRENZY (subtraction and division) The hungry gator arrives... save the fish... play the BONUS game... FLIP FLOP (transformed geometry) look at the two figures... do they need to flip, turn or slide? (Diskette)

7:30

SOLAR FOX

It's erase or be erased as you navigate spaceship over a grid of colorful pulsating entities, armed with laser. Unlimited levels. A BALLY MIDWAY original. (Cartridge)

8:00

EASY SCRIPT

Our best wordprocessor. Displays 764 lines by 40 characters. Prints over 130 columns. Global/local search/replace/hunt/find. Super/subscripts. Insert/delete characters, lines, sentences, paragraphs. (Diskette)

8:30

THE MANAGER

A powerful database management system. For business, educational or personal files. Not for Rockford's files. With four built-in applications. Or design your own. (Diskette)

9:00

MAGIC DESK I

The scene opens on an office desk, complete with digital clock, typewriter, wastebasket and file cabinet. Select functions (typing, filing, editing) by pointing animated finger (Cartridge)

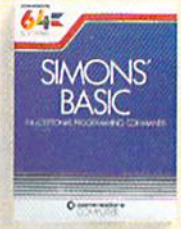
9:30

INTER-NATIONAL SOCCER

(Gold Medallion Game) Sports highlight. With passing, kicking, diving goalies, even trophies! Great color, 3-D realism. No locker room interviews. (Cartridge)

10:00

SIMONS' BASIC



Rated PG. Expands Commodore BASIC by an additional 114 commands. Convenient programming commands such as RENUMBER and TRACE plus graphics plotting command. (Cartridge)

Announcing the most exciting variety show on television.

Featuring many of the stars of arcade games, education and the business world.

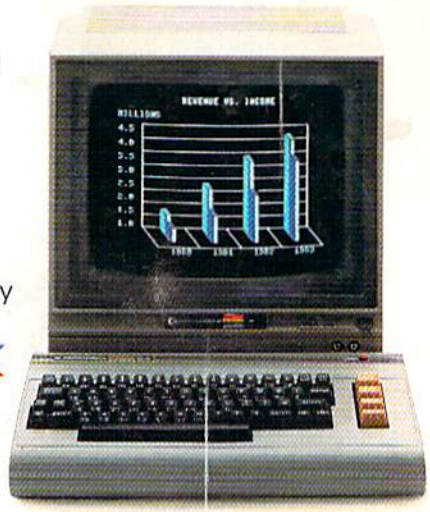
Produced by (and for) Commodore, the people who bring you the Commodore 64,™ a 64K computer that would be a value at three times its price. In fact, many of its competitors are three times its price.

Produced in living high resolution graphics with 16 available colors and with eight 3-dimensional sprites.

With a real high fidelity sound that covers a 9-octave range.

And a supporting cast of low-price, high capacity disk drives, printers, monitors (a better way to watch Commodore 64) and modems.

So, if you're not pleased with what's on your tv set tonight, simply turn on your Commodore 64.

COMMODORE 64

IT'S NOT HOW LITTLE IT COSTS, IT'S HOW MUCH YOU GET.